BEFORE THE FLORIDA PUBLIC SERVICE COMMISION

DOCKET NO. 100009-EI
FLORIDA POWER & LIGHT COMPANY

IN RE: NUCLEAR POWER PLANT COST RECOVERY AMOUNT TO BE RECOVERED DURING THE PERIOD JANUARY - DECEMBER 2011

REBUTTAL TESTIMONY OF:

STEVEN R. SIM

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DOCKET NO. 100009 - EI

August 3, 2010

Q. Please state your name and business address.

A. My name is Steven R. Sim and my business address is Florida Power & Light Company, 9250 West Flagler Street, Miami, Florida 33174.

Q. Have you previously submitted direct testimony in this proceeding?

A. Yes.

Q. Are you sponsoring any rebuttal exhibits in this case?

A. Yes. I am sponsoring the following exhibits that are attached to my rebuttal testimony:

Exhibit SRS-12: Scenario Analysis of FPL's EPU Project Using Witness Jacobs' "What If" Cost Assumption

Exhibit SRS-13: Transcript of Dr. Jacobs' Panel Testimony

Exhibit SRS-14: Screening Curve Analysis Steven R. Sim Testimony in Docket No. 080407 - EG

Exhibit SRS-15: Comparison of Key Assumptions Utilized in the 2009 and 2010 Economic Analyses of FPL Nuclear Projects: Summer Peak Demand Load Forecast (Expanded)

Exhibit SRS-16: SACE's Inconsistency Regarding CO_2 Costs

Q. What is the purpose of your rebuttal testimony?

A. The purpose of my rebuttal testimony is to discuss and respond to a number of statements and recommendations made by Office of Public Council (OPC) Witness Jacobs, and by Southern Alliance for Clean Energy (SACE) Witnesses Gundersen and Cooper. Each of these three individuals has filed testimony in this docket. My rebuttal testimony will focus primarily on aspects of their testimonies that relate to FPL's 2010 feasibility analyses and resource planning issues.

Q. Before you begin to get into the details of these individual testimonies, do you have any overview comments about the testimonies?

A. Yes. I have two overview comments regarding their testimonies:

(1) A review of the resumes and curriculum vitae of these three witnesses shows no evidence that any of them have actually performed either reliability analyses for a specific electric utility or, more importantly for this docket, detailed economic analyses for a specific electric utility of the type that FPL performs for its system and which the Florida Public Service Commission (FPSC) expects to see in resource decision dockets. The conclusion that they have never performed such analyses is further supported by a number of clearly erroneous and unsupported statements and claims regarding system reliability and economic analysis of resource options that are made in their testimonies. A few of these erroneous

statements are found in Witness Jacobs' and Gundersen's testimonies; a great many more of them are found in Witness Cooper's testimony.

As will be demonstrated in my rebuttal testimony, these collective testimonies do not present any economic analyses using updated assumptions to challenge FPL's 2010 feasibility analyses for the EPU and Turkey Point 6 & 7 projects. FPL's 2010 feasibility analyses, which did use updated assumptions, continue to show that both of these projects are projected to be cost-effective additions for FPL's customers. The absence of experience in performing such utility-specific analyses, combined with the demonstrable errors, supports a conclusion that these witnesses should not be relied upon by the FPSC in making decisions concerning economic feasibility of electric resource planning alternatives, such as FPL's EPU and Turkey Point 6 & 7 projects.

(2) In regard to SACE Witnesses Gundersen and Cooper, their testimonies provide little, if any, new information compared to what they presented in the 2009 NCRC docket. Indeed, they frequently refer to their 2009 testimonies and appear to repeatedly fall back on that outdated information. In doing so, they repeat certain errors (such as the use of an inappropriate analytical approach) that were pointed out in last year's docket. In addition, their unfamiliarity with utility resource planning concepts and techniques has resulted in new errors being made in their testimonies this year. However, perhaps the most disappointing aspect of

the SACE witnesses' testimonies is that they are entirely one-sided. Thus, their testimonies are unreliable because they are systematically biased. Their conclusions depend upon their highly selective choice of data that favors their desired position (i.e., the use of forecasts that show only low gas and carbon costs for 50 years) and their sole focus on the cost of building nuclear units without any discussion of the potential benefits to FPL's customers of the operation of new nuclear units. There is scarcely an acknowledgement that new nuclear units might actually offer benefits to FPL's customers. Such an approach is not an appropriate or accepted method of performing resource planning analyses.

This is in stark contrast to an appropriate resource planning approach in which analyses using accepted methodologies (such as a comparison of total system costs when comparing generation options) incorporate a wide range of current/updated forecasts for key assumptions such as fuel costs and emission costs in order to address uncertainty regarding those factors. FPL's 2010 feasibility analyses is just such an appropriate resource planning approach which has been used numerous times to provide the FPSC with a complete accounting of both costs and benefits associated with resource option decisions.

The systematic bias that is evident throughout the intervener testimonies only serves to make their testimonies even less worthy of serious

consideration. Consequently, it is my recommendation that the testimonies of Witnesses Jacobs, Gundersen, and Cooper should not be relied upon for decision-making purposes, and should be rejected by the FPSC.

Q. Please summarize your rebuttal testimony regarding OPC's Witness Jacobs.

A. I address two aspects of Witness Jacobs' testimony. First, he states that the EPU project cost might be higher than FPL's current high end capital cost estimate, but he fails to take the next two logical steps: (i) he does not attempt to evaluate how likely such a cost increase is, and (ii) he does not calculate what impact such a cost increase would have on the projected cost-effectiveness of the EPU project. My rebuttal testimony shows that, even if one were to ignore how likely such a cost increase is, the EPU project would continue to be projected as solidly cost-effective. My testimony also points out that not only did he fail to address the projected cost-effectiveness of the EPU project, his testimony failed to even consider the numerous economic and environmental benefits that the EPU effort is projected to provide to FPL's customers.

Second, Witness Jacobs states that FPL should have not excluded sunk costs in its feasibility analyses of the EPU project. My rebuttal testimony points out that his statement: (i) is essentially a recommendation that FPL ignore guidance provided by the FPSC regarding sunk costs, (ii) would lead to the introduction of arbitrariness into the well understood concept of sunk costs,

and (iii) is not consistent with panel testimony provided by Witness Jacobs in a recent Georgia Public Service Commission nuclear docket. Therefore, Witness Jacobs's discussion of sunk costs does not warrant serious consideration.

Q. Please summarize your rebuttal testimony regarding SACE's Witness Gundersen.

A. I address statements in Witness Gundersen's testimony with which he attempts to make three points against the Turkey Point 6 & 7 project. First, he attempts to cast doubt about the economics of the project by referring to the "busbar costs" of nuclear energy. My rebuttal testimony once again provides a full explanation of the severe limitations in this type of analytical approach, as I did in 2009. These limitations demonstrate why Witness Gundersen's reference to "busbar costs" is meaningless in regard to resource option decision-making in this docket. The explanation of the inadequacies of busbar costs as an analytical tool is provided in Exhibit SRS – 14.

Second, Witness Gundersen suggests that there may not be sufficient load growth to justify a resource need which the Turkey Point 6 & 7 units could fill. My rebuttal testimony points out that FPL's direct testimony contains more than enough information to show that: (i) FPL's projected load growth is still significant with a projected growth in Summer peak load of more than 5,200 MW by 2022, and (ii) that projected load growth results in the need to

add additional resources starting in 2022 and 2023; i.e., the years projected as the in-service years for Turkey Point 6 & 7.

Third, Witness Gundersen then calls for an immediate termination of expenditures for the Turkey Point 6 & 7 project (a *"...cancellation of the units..."*), because it would be the *"...least cost option..."*. My rebuttal testimony points out Witness Gundersen has not performed any analysis, or presented any evidence, supporting his opinion that cancellation would be the least cost option. FPL is currently requesting approval to recover costs associated with the continued pursuit through 2011 of the licensing and permitting of new nuclear units at Turkey Point. Securing these licenses and permits will provide FPL and its customers with an option to construct new nuclear units that may be exercised in the future.

My rebuttal testimony then addresses Witness Gundersen's one-sided focus on projected expenditures to obtain licensing and permitting (the amount of which Witness Gundersen never specifies) and points out that he never discusses the benefit side of the benefits-to-cost question that is always present when discussing resource options. My rebuttal testimony discusses the projected amount of 2010 and 2011 expenditures FPL is currently requesting approval for in order to continue work on the licenses and permits (approximately $72 million). Then, in order to show how a cost-only perspective would change dramatically if even only one aspect of the

projected benefits was introduced into the picture, these 2010 and 2011 costs are compared to the projected fuel savings benefits of Turkey Point 6 & 7 of approximately $95 billion. Thus my testimony provides a more balanced perspective of the projected costs and potential benefits associated with the project.

In summary, my rebuttal testimony demonstrates that Witness Gundersen's testimony: (i) fails to provide any economic results that could be used to challenge FPL's updated 2010 feasibility analyses, (ii) ignores testimony showing that there is a resource need in 2022 and 2023 that could be met by Turkey Point 6 & 7, and (iii) is an entirely one-sided discussion of only costs that attempts to derail further pursuit of a resource option that not only has enormous potential benefits for FPL's customers, but for which FPL's updated 2010 feasibility analyses continue to project as solidly cost-effective.

Q. Please summarize your rebuttal testimony regarding SACE's Witness Cooper.

My rebuttal testimony addresses a large number of problems with Witness Cooper's testimony by first grouping these problems in five general areas. The first area deals with Witness Cooper's approach to the issue of uncertainty. Although Witness Cooper continues to pay lip service to the fact that uncertainty exists when examining resource options over a 50-year period of time, he again this year chooses to ignore the issue of uncertainty when it suits his objectives. As evidence of that, he selects a single forecast of low gas and

carbon costs, then attempts to persuade us that this single forecast is so accurate for a half-century period that resource decisions can confidently be made without consideration of any other potential gas and carbon costs in the future.

In contrast, FPL's approach is to use multiple forecasts that account for a very wide range of fuel costs and environmental compliance costs, then to combine those multiple forecasts into multiple scenarios. The FPL approach is a more robust and far superior approach to analysis and decision-making when facing an uncertain future. FPL's approach allows economic analyses of resource options to be tested over a very wide range of fuel and environmental compliance costs over the 50-year period. Ironically, Witness Cooper fails to realize that the values in the single forecast he selected are already accounted for in FPL's wide range of forecasted values.

The second area of Witness Cooper's testimony that I address involves a number of inaccurate and/or misleading statements he has made in his testimony. These statements generally refer to FPL's 2010 feasibility analyses and resource planning issues. Because the range of his inaccurate and/or misleading statements is so extensive, it is apparent that Witness Cooper is not only unfamiliar with the updated feasibility analyses that FPL has provided to the FPSC in 2010, but that he is unfamiliar with a number of fundamental resource planning terms and concepts.

The third area of Witness Cooper's testimony that I address pertains to the "analyses" that he attempted to perform and the results of those analyses that he presents in a number of exhibits. Just as he did in his 2009 testimony, Witness Cooper attempts to perform some resource planning-type analyses in his testimony this year. And, just like last year, Witness Cooper made numerous errors in both logic and execution in his analyses. Consequently, the analysis results that he presents in (at least) Exhibits MNC – 10, 11, 15, 16, and 17 are meaningless. In addition, his Exhibits MNC – 6, 7, and 12 are completely unconvincing as Witness Cooper labors to persuade us of his core assumption -- that natural gas and carbon dioxide (CO_2) costs can be counted on with absolute certainty to remain low for the next 50 years.

The fourth area of Witness Cooper's testimony that I address includes a number of considerations of his testimony, including the fact that he has failed to provide any updated economic analyses of the Turkey Point 6 & 7 project. Instead, as Witness Gundersen has done, he makes brief references to busbar cost estimates of alternative resource options that were developed by others some years back. My rebuttal testimony again points out that a thorough explanation was provided in last year's docket, and is repeated in this rebuttal testimony (in Exhibit SRS – 14), of why a busbar cost approach is wholly inappropriate for making decisions about resource options. Due to the inadequacies in this analytical approach, neither FPL nor the FPSC make

resource decisions based on busbar costs, which is an incorrect and misguided tool to use in making such decisions.

As previously mentioned, a number of other considerations are addressed in this fourth section of my rebuttal testimony. One of these involves Witness Cooper's suggestion of four types of renewable energy as alternatives to nuclear: photovoltaics (PV), concentrating solar, geothermal, and wind. However, two of these (geothermal and wind) are not widely applicable in Florida. As for the other two types, PV and concentrating solar, these are resource options that FPL strongly supports for use in Florida and pursues as part of a balanced portfolio that also includes nuclear energy. However, PV and concentrating solar are considered as non-firm energy sources and, therefore, do not contribute to FPL's reserve margin while nuclear units' firm capacity does contribute.

Another consideration is Witness Cooper's failure to adequately consider the consequences of his insistence on relying upon a single selected low forecast of gas and carbon costs in an attempt to lower the projected economic advantage of new nuclear units. However, lower gas and carbon costs would also generally make energy efficiency and renewables less economically attractive. Furthermore, the resulting lower prices for electricity due to lower fuel and environmental compliance costs would increase the demand for

electricity, thus increasing FPL's projected need for new resources such as Turkey Point 6 & 7.

Yet another consideration is the troubling use of selecting a single forecast in an attempt to achieve a specific objective. This attempt by Witness Cooper (who appears on behalf of SACE) to substitute a selected forecast for the analysis of one specific resource option (new nuclear units), in place of FPL's updated multiple forecasts that are typically used in all of FPL's resource planning work, is not an appropriate approach to resource planning and decision-making. SACE's witnesses have used this "selective" approach in several recent FPSC dockets in regard to carbon costs. SACE's practice is inappropriate and should not be accepted or relied upon by the FPSC.

Another consideration is Witness Cooper's suggestions for the FPSC to establish a 'template' with which to base its decisions on and to consider in the future that changes in return on equity (ROE) and discount rates may impact annual feasibility analyses. However, the FPSC already has a template consisting of these annual feasibility analyses that has been in use since 2007. FPL's analytical approach has consistently provided a comprehensive set of analyses using a very broad range of updated forecasted costs for fuel and environmental compliance costs. In addition, this analytical approach is a flexible one. That flexibility was shown this year by the inclusion of a full set of analyses using a different scenario of ROE and discount rate values.

In addition, Witness Cooper again this year calls for FPL to consider the 'entirety of federal policy' regarding global warming/climate change. Because no such "policy" exists (all that exists is a complex piece of pending legislation that has essentially sat idle for a year), it is inappropriate for FPL to attempt to do so. FPL's use of a broad range of CO_2 compliance costs is an appropriate approach to take in resource planning at this time. FPL's analyses will account for all aspects of any such federal or state policy once actual laws and/or regulations exist. However, when considering the "entirety" of potential laws, it is highly likely that any actual laws addressing global warming/climate change will strongly encourage the implementation of new nuclear units.

The fifth area of Witness Cooper's testimony that I discuss focuses on areas of his testimony that I believe are actually supportive of the approach FPL is taking in regard to new nuclear units. Witness Cooper states that keeping options open is valuable and that the prudent approach is to not make rigid, expensive decisions before these decisions need to be made so that uncertainties can diminish. FPL's careful, stepwise approach to creating the option for new nuclear units at its Turkey Point site is entirely consistent with Witness Cooper's stated beliefs. It keeps the option of new nuclear capacity open for FPL's customers and the stepwise approach includes annual analyses and FPSC review.

In summary, my rebuttal testimony shows that, for all of these reasons, Witness Cooper's claim that FPL immediately stop its on-going evaluation of the new Turkey Point 6 & 7 nuclear units does not warrant serious consideration.

Q. Please provide an overview of your rebuttal testimony.

A. I have organized my comments into four sections. In section I, I discuss Witness Jacob's testimony regarding his single-minded focus on the cost side of the EPU project without any consideration of the benefit side of the project or the projected cost-effectiveness of the project. I also discuss his suggestion regarding the treatment of sunk costs in feasibility analyses.

In section II, I address three aspects of Witness Gundersen's testimony: (i) his passing reference to busbar costs as a substitute for any actual economic analysis of new nuclear units, (ii) his incorrect assertion that FPL's projected load growth does not justify a need for new resources which Turkey Point 6 & 7 could address, and (iii) his short-sighted, narrow view of only the near-term costs of FPL's Turkey Point 6 & 7 project that does not place those projected expenditures into any sort of meaningful context.

In section III, I discuss Witness Cooper's testimony using the following five broad categories for discussion:

III. A. Continued Problems Regarding "Uncertainty"

III. B. Inaccurate/Misleading Statements

III.C. Problems with His "Analyses" and Exhibits

III.D. No Economic Analyses and Other Considerations

III.E. Where Witness Cooper Seems to Agree with FPL's Approach

In section IV, I offer some concluding remarks.

I. Witness Jacob's Testimony

Q. What aspects of Witness Jacob's testimony will you address?

A. There are two points that Witness Jacobs makes in his testimony that I will address: (i) his extrapolation of a High Bridge potential cost estimate for one of FPL's four existing nuclear units to all four of these units; and (ii) his statement that it is not appropriate to remove sunk costs in FPL's annual feasibility analyses.

Q. What did he do in regard to this first point?

A. On page 9, lines 11 – 14, of his testimony, Witness Jacobs takes the difference between FPL's Turkey Point Unit 3 cost estimate and the High Bridge estimate, assumes that the difference will apply equally to all of FPL's nuclear units, and applies that difference as an increase to the high end of the total cost estimate range.

Q. What is your reaction to that exercise?

A. I find this to be a very incomplete "analysis" of the EPU project. There are two reasons his analysis is incomplete. First, Witness Jacobs does not opine on how likely it is that a cost estimate for the one specific unit (Turkey Point 3) would automatically apply to three different units. Witness Jacobs is postulating a "what if" scenario: "what if" High Bridge's cost estimate for Turkey Point 3 is also applicable for three different units, then the total cost of the EPU project would increase. However, he gives no indication as to how likely it is that this would occur. FPL Witness Jones discusses this "what if" in his rebuttal testimony.

Second, Witness Jacobs does not take the next logical step in regard to his higher cost assumption; namely, he does not attempt to answer the question: "what impact would these assumed higher costs have on FPL's 2010 feasibility analysis results for the EPU project?" He offers no discussion of what the projected net benefits (i.e., the projected benefits minus the projected costs) of the overall EPU project would be even if one were to use his "what if" assumption of a higher cost value. This is key because it is the net benefits result that is important to FPL's customers.

Q. What would be the impact on the EPU project's feasibility analysis if such an assumption were made?

A. Exhibit SRS – 12 provides that information. In this exhibit, the results for FPL's base case feasibility analyses for the EPU project are presented in

Column (1). The base case used an ROE value of 10.0%. In addition, Column (3) of Exhibit SRS – 12 presents the results of FPL's sensitivity analysis in which an ROE of 11.75% was assumed. (These results were previously provided in my direct testimony in Column (5) of Exhibits SRS – 7 and Exhibit SRS – 8, respectively.)

The values presented in Columns (1) and (3) of Exhibit SRS – 12 are then adjusted by using an approximate cumulative present value of revenue requirements (CPVRR) value associated with Witness Jacobs' assumed additional higher construction cost. The results of applying the CPVRR value associated with Witness Jacobs' assumption to both the base case and sensitivity analyses are shown in Columns (2) and (4), respectively, of Exhibit SRS-12. This assumed additional CPVRR cost value would have the effect of reducing the original projected net benefits values, resulting in a new, lower projected net benefits values tied to Witness Jacobs' "what if" assumption.

As Exhibit SRS – 12 shows in Column (2), even after ignoring any consideration of the likelihood of the "what if" scenario occurring, the EPU project would continue to be projected as cost-effective in all 7 of 7 fuel cost/environmental compliance cost scenarios in the base case analysis. The projected net benefits range from $94 million CPVRR to more than $1.7 billion CPVRR. Furthermore, as shown in Column (4) of this exhibit, the EPU project would continue to be projected as cost-effective in 6 of 7 fuel

cost/environmental compliance cost scenarios in the sensitivity analyses. The range of projected net benefits for the 6 cost-effective "what if" scenarios is from $281 million CPVRR to almost $1.3 billion CPVRR. The only scenario in this "what if" version of the sensitivity analysis in which the EPU project would no longer be projected to be cost-effective is a scenario featuring both low fuel cost and low environmental compliance costs.

Therefore, even if one were to take Witness Jacobs' "what if" statement at face value, the EPU project would continue to be projected as solidly cost-effective.

Q. Despite Witness Jacobs' single-minded focus on EPU costs in his testimony, was there a reference in any of the other intervener testimonies to the projected benefits offered to FPL's customers by the EPU project?

A. Yes. SACE witness Gundersen provides that information. In his exhibit AG – 2, page 3 of 3, he quotes FPL President Armando Olivera stating in an interview with the Sun-Sentinel newspaper that "Frankly, we wish we had more nuclear, our bills would be even lower than they are today" and "...if upgrades at FPL's Turkey Point and St. Lucie County plants were done five years ago, customers would have saved an estimated $1.2 billion in fuel costs." I agree with Mr. Olivera's statements.

Q. Did Witness Jacobs' testimony offer any discussion of the projected benefits associated with the EPU project which would be realized by FPL's customers?

A. No. Those projected benefits include: (i) a significant amount of additional baseload firm capacity which will have extremely low operating costs, (ii) the unique opportunity to acquire new nuclear capacity without the need for securing a new site(s), (iii) a significant reduction in FPL system fuel costs, (iv) a significant reduction in FPL system reliance upon natural gas, which faces delivery constraints in peninsular Florida, (v) a significant reduction in system CO_2 emissions, (vi) providing a hedge or insurance against fossil fuel cost increases, fossil fuel availability problems, and potential new environmental regulations, and (vii) assisting with the long-term system concern of maintaining a balance between generation and load in Southeastern Florida.

Q. In regard to the potential benefits of the EPU project, did Witness Jacobs discuss the possibility that even greater benefits from the EPU project than are currently projected in FPL's 2010 feasibility analyses could be delivered to FPL's customers if the operating licenses for FPL's four existing nuclear units were extended?

A. No. Although FPL's 2010 feasibility analyses do not assume an operating license extension, the additional potential benefits that would result from the EPU project if an extension were to occur are significant. For example, assuming that the operating licenses for FPL's four existing units were each

extended for 20 additional years, and using a Medium Fuel Cost and Env II environmental compliance cost scenario, the projected benefits to FPL's customers from the EPU project would be increased from those shown in my direct testimony by approximately $1,500 million CPVRR. Although this analysis includes no additional costs for a potential license extension effort, it provides an idea of the magnitude of the additional potential benefits that could occur from the EPU project if license extensions were to occur.

Q. What statement did Witness Jacobs make in regard to sunk costs in FPL's feasibility analyses?

A. On page 9, lines 16 through 20, Witness Jacobs states the following: *"Q. Is FPL's current methodology for determining the economic feasibility of a project in which the sunk costs are ignored appropriate for a project with increasing costs? A. No, it is not."*

Q. What was your reaction to that statement?

A. I was surprised by this statement for three reasons. First, in Order No. PSC-08-0237-FOF-EI, the FPSC provided specific guidance to FPL regarding the requirements of long-term nuclear feasibility analyses. The relevant part of that Order on page 29 reads as follows:

> "FPL shall provide a long-term feasibility analysis as part of its annual cost recovery process which, in this case, shall also include updated fuel costs, environmental forecasts, break-even costs, and capital cost estimates. In addition, FPL should account for sunk costs."

This guidance from the FPSC clearly distinguishes "sunk costs" from "updated capital cost estimates" in regard to feasibility analyses. Consequently, FPL has effectively separated sunk costs from its updated capital cost estimates, resulting in the use of the relevant portion of the updated capital cost estimate (i.e., the "going forward" portion of the capital costs) in its feasibility analysis. FPL's approach to sunk costs follows the FPSC's guidance. Witness Jacobs' statements surprise me because he is recommending that FPL should ignore the FPSC's guidance.

Second, FPL's approach is consistent with the common understanding of the concept of sunk costs as being costs that once spent, are not relevant to a "going forward" decision that is being made today. Yet Witness Jacobs' testimony recommends that the concept of sunk costs is somehow "conditional". In other words, he suggests that costs that have already been incurred should not be included in one decision-making case, but should be included in another decision-making case if the projected future costs have increased by some unspecified threshold amount compared to the preceding cost projection. Witness Jacobs' recommendation surprises me because the arbitrariness that would be introduced from his recommendation would undermine the very concept of sunk costs as the concept is commonly understood. Decision-making should look at only the costs and benefits of the

options being considered that will be incurred going forward from the current point in time.

Third, I was also surprised by the fact that Witness Jacobs's statement that sunk costs should be thought of as somehow conditional is not consistent with recent testimony he was a part of. In Docket No. 29849, the Georgia Public Service Commission addressed the "Review of Proposed Revisions and Verification of Expenditures Pursuant to GEORGIA POWER COMPANY's Certificate of Public Convenience and Necessity for Plant Vogtle Units 3 and 4".

In testimony on December 16, 2009, Dr. Jacobs was on the stand as part of panel testimony with a Mr. Hayet. The relevant part of that testimony appears starting on page 202, line 18, through page 203, line 7:

> "Q. In Georgia Power's economic analysis, you make reference to the fact that they ignore sunk costs and also they said that they ignore the weighting of various factors. I think that's page 25. Could you kind of elaborate on that, please? And why that matters or doesn't matter?"
>
> A. (Witness Hayet) "The point there is just to point out that the economic analysis as you go forward with the project, the question that you have to answer is what are the future costs that will be

incurred and what do those costs – how do those costs compare to your next best alternative. So, the notion of the costs that have already been spent as being sunk is something that you ignore and we're just simply pointing that out, that's the company's practice, we agree with it and that's fairly industry standard."

Pages 202 and 203 of testimony in this docket are presented in Exhibit SRS – 13.

Yet Witness Jacobs, who less than 7 months later is recommending that the concept of sunk costs should be thought of as being somehow conditional, was comfortable with his co-panelist Mr. Hayet stating that both of them agreed with the conventional approach to sunk costs; i.e., sunk costs should be removed from decision-making. Witness Jacobs does not appear to have offered any suggestion that "conditions" should be placed on the treatment of sunk costs in the Georgia Public Service Commission docket.

FPL's 2010 feasibility analyses have both followed the FPSC's specific guidance, and are consistent with the conventional understanding of sunk costs, by removing sunk costs from the analyses. Consequently, Witness Jacobs' recommendation regarding a different "conditional" treatment of sunk costs does not warrant serious consideration.

II. Witness Gundersen's Testimony

Q. What aspects of Witness Gundersen's testimony will you address?

A. Witness Gundersen's testimony solely addresses new nuclear units. In that regard, there are four statements that Witness Gundersen makes in his testimony regarding feasibility analyses and utility resource planning that I will address:

(i) *"...it is not clear that the ultimate busbar cost for nuclear power electricity could ever be justified."* (page 12, lines 1 and 2);

(ii) *"...it does not appear that Florida's current load growth even warrants the construction of these plants."* (page 12, lines 2 - 4);

(iii) *"In my opinion, immediately terminating all work on these projects would result in the lowest costs to the ratepayers of the State of Florida."* (starting on page 25, line 20, through page 26, line 1); and,

(iv) *"...the least cost option would be the immediate cancellation of these units."* (page 26, lines 18 and 19).

Q. What is your reaction to the first statement regarding Witness Gundersen's reference to the busbar cost of nuclear power?

A. I am disappointed, but not surprised that SACE's Witnesses Gundersen and Cooper both continue to refer to "busbar costs" (i.e., the levelized dollars per megawatt-hour, or cents per kilowatt-hour, cost of producing electricity) as if

it were a meaningful way to make utility resource decisions. It is not. Neither FPL nor the FPSC use a busbar cost approach in making resource option decisions due to the inadequacies of this approach when attempting to provide a complete economic analysis of resource options.

I am disappointed that SACE's witnesses continue to try to "use" projected busbar costs of resource options as a substitute for actual economic analyses because the inherent inadequacy of such an approach was thoroughly explained to them in the 2009 NCRC docket and was also presented by FPL in the 2009 DSM Goals docket of which SACE was a party. The explanation is again presented as Exhibit SRS – 14.

However, I am not surprised that Witness Gundersen (and Witness Cooper) both carry over their attempted use of busbar costs from their 2009 testimony as a substitute for actual economic analyses because much of their current testimony strikes me as simply repeating themes from their 2009 testimony. There appears to be very little new in their 2010 testimony, particularly in regard to any attempt to provide any economic analyses regarding the feasibility of new nuclear units using updated assumptions. Instead, these witnesses largely attempt to justify their opposition to pursuing the option of new nuclear units through other, largely non-economic arguments, such as diminished load growth.

Q. Would you please respond to Witness Gundersen's second statement that questions whether Florida's current load growth *"warrants the construction of..."* the new nuclear units?

A. Yes. I have two comments regarding this statement. First, in regard to FPL, it is the projected peak demand growth in FPL's service territory that is of importance when FPL determines the need for additional resources, not load growth for the state of Florida as a whole. Second, information already provided in FPL's direct testimony in this docket clearly indicates that: (i) FPL is still facing significant growth in peak demand, and (ii) FPL has a need for adding new resources beginning in the year 2022 and continuing each year thereafter. (The year 2022 is the projected in-service date for the first of the two new nuclear units, Turkey Point 6 & 7.)

To demonstrate the first point, that FPL is still facing significant load growth, Exhibit SRS – 15 is introduced. The first three columns of this exhibit are identical to the information previously provided in my direct testimony in Exhibit SRS – 4 which compare FPL's 2009 and 2010 Summer peak demand load forecasts. As shown in Column (3), FPL 2010 forecast of Summer peak demand is definitely lower than with its 2009 forecast. However, FPL is still facing significant growth in peak demand.

This fact could easily have been determined by Witness Gundersen from Exhibit SRS – 4 by performing one or two simple calculations. The results of

these calculations are now provided in Columns (4) and (5) of Exhibit SRS - 15. As shown in Column (5) of this exhibit, FPL's projected increase in Summer peak demand is in excess of 5,200 MW by 2022. This equates to an average increase in Summer peak demand over this 12-year period of more than 430 MW per year. Furthermore, the projected annual Summer peak load growth after 2022 is even greater than this annual average value. Consequently, it is apparent that, although FPL's projected growth in Summer peak load is currently lower than with its 2009 load forecast, FPL continues to face significant projected growth in Summer peak load.

With this information in hand, a return to previously provided Exhibit SRS – 9 would answer the question Witness Gundersen indirectly poses as to 'whether FPL faces a resource need in the 2022 and 2023 time period to justify the currently assumed in-service dates of Turkey Point 6 & 7?' In examining Exhibit SRS – 9, the projected reserve margin for the year 2021 is 19.9%. This projected reserve margin is marginally under the 20% reserve margin criterion that FPL and the FPSC have agreed that FPL will maintain (and which FPL believes is the minimum reserve margin criterion to use in order to provide reliable electric service to its customers.)

From Exhibit SRS – 15, the projected Summer peak load growth is 367 MW for 2022, and another 738 MW for 2023. Even a casual consideration of what FPL's reserve margin would be in 2022 and 2023, absent resource additions in

those years, would indicate that FPL's reserve margin would drop from 19.9% in 2021 to considerably below 20% in 2022, and drop even further in 2023. (Absent any resource additions in those years, the projected Summer reserve margins for these two years are 18.0% and 14.4%, respectively.)

Q. These resource need projections are based on forecasted Summer peak loads. How have recent actual Summer peak loads compared to the forecasted peak loads?

A. The actual Summer peak loads for both 2009 and 2010 have exceeded the most recent forecasted values. The 2009 forecast of Summer peak load for 2009 was 21,922 MW and the actual 2009 Summer peak load was 22,351 MW. The 2010 forecast of Summer peak load in 2010 (which reflects cumulative effects of the economic downturn) was 21,788 MW. The actual 2010 peak load experienced to-date as this testimony is being prepared, 21,901 MW, has already exceeded this forecast with more than a month of Summer days remaining.

Q. What conclusion do you draw from this examination of forecasted Summer peak load and projected resource needs?

A. I conclude that Witness Gundersen's indirect question of 'whether FPL faces a resource need in the 2022 and 2023 time period to justify the currently assumed in-service dates of Turkey Point 6 & 7?' has been answered in the affirmative.

Q. What is your reaction to the third and fourth statements of Witness Gundersen which basically state that the lowest cost option is to terminate all work on new nuclear units?

A. I have two reactions to the third statement that: *"In my opinion, immediately terminating all work on these projects would result in the lowest costs to the ratepayers of the State of Florida."* First, Witness Gundersen offers no analysis to back up his opinion. Second, his view is very short-sighted. My reaction to the fourth statement, *"...the least cost option would be the immediate cancellation of these units"*, is that it is again an unsupported opinion.

What FPL is requesting approval for in this docket is recovery of the costs, and approval of the underlying decisions, associated with the continued pursuit of obtaining the licenses and permits that would be needed to construct and operate new nuclear units at Turkey Point. Once these licenses and permits are obtained, FPL will have the option to construct new nuclear units. Any decisions to proceed with construction, and to seek approval to recover costs associated with construction, are likely several years away.

What is utterly lost in Witness Gundersen's one-sided view is any consideration of the huge economic, environmental, and system reliability potential benefits that new nuclear units offer for FPL's customers. Witness Gundersen's statements are almost entirely focused on only one of numerous

considerations of new nuclear units: the costs projected to be spent by FPL in the next few years in pursuing the licenses and permits. (In this regard, I find it interesting that he chooses to not mention what these projected expenditures are. I will return to this issue shortly.)

This narrow focus prevents him from any balanced discussion of new nuclear units' because such a discussion would have to address the project's huge potential benefits for FPL's customers. These potential benefits include, but are not necessarily limited to, the following:

- very high capacity factor (approximately 90%) operation for at least 40 years;
- significant reductions in system fossil fuel use;
- significant reductions in system air emissions including CO_2;
- firm capacity (thus contributing to FPL's system reserve margin);
- significant reductions on FPL's (and Florida's) increasing dependency on one type of fuel, natural gas, which is delivered to FPL by two lengthy pipelines; and,
- significant economic savings for FPL's customers.

Taken as a whole, only nuclear capacity can offer this list of potential benefits to FPL's customers.

Witness Gundersen's testimony does not even attempt to address any of these potential benefits for FPL's customers, much less offer any analyses that attempts to evaluate the net impact for FPL's customers. By choosing instead to offer a "cost-only" discussion, his testimony is clearly one-sided against the option of new nuclear units and offers no sense of perspective.

Q. What perspective do you believe should be taken in regard to FPL's filing in this docket?

A. An unbiased perspective would include two considerations: (i) what is FPL requesting approval for and what are those costs, and (ii) how do the prospective costs of this request compare to the potential benefits for FPL's customers? In regard to the first consideration, and as discussed in greater detail in FPL Witness Scroggs' testimony, FPL is requesting approval of the costs and decisions associated with the continued pursuit of the necessary licenses and permits needed to construct new nuclear units at Turkey Point. Assuming FPL accomplishes this, it will have an option to construct new nuclear units and that option is expected to remain open for 20 years.

As shown in FPL Witness Scroggs' direct testimony Exhibit SDS -11, FPL is requesting approval for expenditures in 2010 and 2011 of approximately $72 million to continue to pursue obtaining these licenses and permits. While a significant sum of money, it should be placed in perspective. FPL believes that the correct way to evaluate a resource option is to analyze all of the projected costs and benefits associated with that option. Witness Gundersen

chooses instead to focus only on one aspect: costs, particularly short-term costs. But the picture he attempts to paint changes significantly if even one of the additional benefit components that would be included in a full analysis of all projected costs and benefits is introduced.

For example, considering that FPL's total annual fuel cost is currently projected to be approximately $4 billion, the requested approval amount to continue to pursue obtaining the nuclear licenses and permits is equivalent to FPL's fuel costs for less than 7 days.

However, as previously presented in FPL's direct testimony in this docket, the projected fuel savings from Turkey Point 6 & 7 for even a Medium Fuel Cost scenario are approximately $95 billion over the life of the units. This potential savings from Turkey Point 6 & 7 is equivalent to FPL's customers having zero fuel costs for more than 23 years at current annual fuel costs. Furthermore, this potential fuel savings value does not include other potential savings such as reduced environmental compliance costs, etc.

This newer picture changes little even when one includes the projected total costs to complete the licensing work. That projected cost of approximately $250 million is the equivalent of approximately 23 days of current annual fuel costs. Therefore, the equivalent comparison is of 23 days versus 23 years of current fuel costs when considering just one aspect of the licensing effort's

potential benefits compared to the projected total licensing and permitting costs.

This example shows how short-sighted and incomplete a sole focus on costs can be. A balanced perspective towards FPL's request for approval of the decisions and costs associated with the continued pursuit of licensing and permitting, thus creating an option to construct new nuclear units, would not simply stop with a call to halt projected nuclear expenditures over the next few years as Witness Gundersen's testimony did. Instead, a balanced perspective would seek to provide a full accounting of both projected costs and benefits. This balanced view is provided by FPL's 2010 feasibility analysis.

Q. Please summarize your review of Witness Gundersen's testimony.

A. Witness Gundersen performed no economic analysis of the Turkey Point 6 & 7 project. All he offers in this regard is a brief reference to "busbar costs" of nuclear units. In so doing, he has chosen to ignore the fact that the use of busbar costs is a wholly inadequate approach to use in making resource decisions (as was explained in detail in last year's NCRC docket and is repeated in this docket.) Neither FPL nor the FPSC make resource option decisions using this inadequate analytical approach. Consequently, Witness Gundersen does not refute FPL's 2010 feasibility analyses that the Turkey Point 6 & 7 units are projected to be cost-effective additions for FPL's customers.

Without an economic argument, Witness Gundersen attempts to make a case that load growth does not justify the need for new nuclear units in the years that Turkey Point 6 & 7 are projected to come in-service, 2022 and 2023. In choosing to make this argument, he has ignored the fact that sufficient information was presented in FPL's direct filing to answer that question. It is clear from this information that FPL's current projections of load growth and resource need fully justify the need for new resources in 2022 and 2023 that Turkey Point 6 & 7 could supply.

Finally, Witness Gundersen further reveals his bias against new nuclear units by stating that not spending any more money on new nuclear is the least cost option without providing any analysis to support his opinion. This argument strikes me as analogous to someone who chooses not to invest money solely on the thought that, if they keep the money in their pocket, their immediate expenditures are lower. Such an individual never even takes a serious look at the fact that the potential long-term benefits from the investment may be enormous.

III. Witness Cooper's Testimony

Q. What aspects of Witness Cooper's testimony will you address?

A. There are so many aspects of Witness Cooper's testimony relating to FPL's approach to pursuing the option of new nuclear units, and to resource option analysis, that need to be corrected or debunked that I will not attempt to list them all here. Instead, my testimony will address the following five "groupings" or areas of his testimony:

III. A. Continued Problems Regarding "Uncertainty"

III. B. Inaccurate/Misleading Statements

III.C. Problems with His "Analyses" and Exhibits

III.D. No Economic Analyses and Other Considerations

III.E. Where Witness Cooper Agrees with FPL's Approach

III. A Continued Problems Regarding "Uncertainty"

Q. Please provide an overview of what you will address in this section of your testimony.

A. This section of my rebuttal testimony will examine the "uncertainty" aspect of his testimony. As previously stated, my view of Witness Cooper's 2010 testimony is that there is relatively little new information that was not presented in his 2009 testimony. Two of the major underpinnings of his 2009

testimony were the following contradictory assumptions: (i) the future is highly uncertain, but (ii) a single forecast of low gas costs and carbon costs can be relied upon to address a 50-year period with such accuracy that no other view of the future is needed. FPL's rebuttal testimony in the 2009 docket pointed out the obvious contradictions between Witness Cooper's two assumptions and stressed the folly of assuming that any single 50-year forecast could be counted upon to accurately portray the future.

In his 2010 testimony, Witness Cooper appears to have modified this pairing of contradictory assumptions a bit, but he has not gone far enough.

Q. Would you provide a few examples of Witness Cooper's statements regarding uncertainty in his current testimony?

A. The following two groupings of passages provide what I believe to be a representative sampling of his contradictory statements regarding uncertainty. The first grouping includes the following three passages:

- *"the high degree of uncertainty in the economic environment that new reactors face."* (page 5, line 9)
- *"...the highly uncertain future that nuclear reactors face."* (page 8, line 19)
- *"The characteristics of nuclear reactors are the antithesis of those best suited to an uncertain environment."* (page 9, lines 1 and 2)

These three passages appear to show that Witness Cooper at least still acknowledges that we face a very uncertain future. However, as these passages show, he crafts this message so that it appears that only new nuclear units are facing this uncertainty. The reality, of course, is that all resource options that utilities consider face a wide variety of uncertainties over many years.

But Witness Cooper leaps to the conclusion that much of the uncertainty regarding gas costs and load growth will soon vanish as evidenced by the following four passages:

- *"Over the next few years the high degree of uncertainty regarding all of the key parameters that affect the decision may be sharply reduced: market factors including demand growth after the recession and gas prices..." (page 39, lines 4 – 6);*
- *"The uncertainty about both natural gas prices and demand growth are likely to vanish." (page 22, line 1);*
- *"When shifts in key economic variables appear to be permanent, or at least long-term..." (page 12, lines 12 and 13); and,*
- *"...they have not lowered the* (fuel) *price projections to accord with reality." (page 6, lines 4 and 5).*

Witness Cooper does not explain how these historically highly uncertain factors will soon be able to be forecasted with absolute accuracy for 10 years in the future (the approximate time period the new nuclear units would go into service), much less out to 50 years in the future (thus accounting for the 40-year projected life of the nuclear units.) However, his testimony indicates that he believes that a single forecast he creates based on information from EIA provides absolute certainty for future natural gas costs, and that another single forecast he creates based on information from EPA provides absolute certainty for future CO_2 costs as well.

(Witness Cooper begins with a single EIA gas cost forecast, and a single EPA CO_2 cost forecast. He then adjusts both forecasts in an attempt to place them on a common basis with FPL's gas and CO_2 cost forecasts. He also makes an adjustment to FPL's Env II CO_2 cost forecast for the same reason. In the discussions that follow, I will be referring to the gas and CO_2 forecasts he uses after his adjustments are made. I will refer to his adjusted forecasts as his "selected" forecasts.)

Witness Cooper has selected a single forecast of low natural gas costs, and a single low forecast of CO_2 costs, and then uses them in his testimony as if these single forecasts could be solely relied upon with total confidence in long-term analyses of resource options without even considering the

possibility that these single forecasts, like virtually any other single forecast that attempts to predict unknown costs for half a century, may be wrong.

Q. What is your reaction to these portions of his testimony?

A. I have several reactions or comments regarding this part of his testimony. First, his 2010 testimony shows that he has progressed a bit from his 2009 testimony to at least give lip service to the fact that uncertainty exists in regard to important economic factors in resource option analyses such as fuel cost forecasts, environmental compliance cost forecasts, load growth, etc. However, he has moved only slightly in this direction by indicating that this uncertainty may exist for at least a few years before the uncertainty magically vanishes for all factors except new nuclear units.

Second, disregarding his own statements indicating that uncertainty currently exists for these factors, he reverts back to the ill-advised approach he used in his 2009 testimony. He again selects a single low forecast for gas costs over 50 years and a single low forecast for carbon costs over 50 years. He then attempts to make the case that these forecasts can be relied upon with absolute certainty, ignoring all other possibilities, to analyze and reach conclusions regarding resource options. His logic is as faulty now as it was a year ago. No single long-term forecast of such unknown factors as gas costs, carbon costs, load growth, etc. can effectively address the inherent uncertainty in those factors over half a century.

Third, Witness Cooper conveniently fails to mention, or otherwise acknowledge, that FPL's 2010 feasibility analyses continue to address uncertainty in long-term forecasts of gas (and other fuel) costs, and environmental compliance costs, by using multiple forecasts of these costs, and then by combining those multiple forecasts into multiple scenarios. FPL uses a low cost forecast, a medium cost forecast, and a high cost forecast for each of these factors. This allows a FPL to examine the long-term economic feasibility of Turkey Point 6 & 7 over a very wide range of these future costs, thus addressing the inherent uncertainty of these future costs. FPL's approach is certainly a more meaningful way to address uncertainty than to simply assume that one can somehow select a single forecast that will accurately predict costs for 50 years in the future as Witness Cooper believes.

In fact, EPA itself recognizes that uncertainty cannot be addressed with a single forecast. Although Witness Cooper discusses an EPA forecast for CO_2 costs as if EPA produced, or used, only a single forecast in the EPA document he uses as a reference, this is not the case. The referenced EPA document discusses at least 18 different CO_2 cost forecasts. Although this document does not provide a complete listing of projected costs for all of the other 17 forecasts, it does provide that information for 10 of these forecasts. The costs in these 10 other forecasts range from 229% higher, to 32% lower, than the single forecast Witness Cooper has chosen to use as his stating point. Consequently, EPA uses a multi-forecast/scenario approach (similar to FPL's

approach) which includes forecasts with significantly higher costs than the single EPA forecast Witness Cooper chose to use as his starting point in creating his selected CO_2 forecast.

Fourth, and perhaps most importantly, Witness Cooper fails to mention (and maybe to recognize) that the projected cost values in his single selected forecasts are already accounted for within the very wide range of gas and carbon costs encompassed in the multiple cost forecasts that FPL used in its 2010 feasibility analyses. Thus, if Witness Cooper believes that his selected gas price forecast reflects future 'reality', his claim that FPL's broad range of projected fuel prices (that account for his selected gas prices) do not 'accord with reality' is clearly illogical. And, as shown in the results of FPL's feasibility analyses, Turkey Point 6 & 7 are projected to be cost-effective additions for FPL's customers under all of the scenarios of fuel costs and environmental compliance costs, including those scenarios that account for the cost values in his selected forecasts.

Therefore, the portion of Witness Cooper's testimony in which he discusses his selected single low forecasted gas and carbon costs is unnecessary.

Q. Please summarize your review of the portions of Witness Cooper's testimony that addresses uncertainty.

A. The portions of Witness Cooper's testimony that address the concept of uncertainty demonstrate that although he continues to pay lip service to the

uncertainty that exists when examining a resource options over a half century, he continues to ignore uncertainty when he believes it suits his objectives. As evidence of that, he again selects a single low forecast of gas and carbon costs, then attempts to persuade us that this single forecast is so accurate for a 50-year period that resource decisions can confidently be made using no other view of the future. His argument is not persuasive. The approach utilized by FPL to use multiple forecasts for highly uncertain factors such as fuel costs and environmental compliance costs, then to combine those multiple forecasts into multiple scenarios, is a far superior approach to analysis and decision-making. FPL's approach allows economic analyses of resource options to be tested over a very wide range of fuel and environmental compliance costs over the 50-year period. Ironically, Witness Cooper also fails to realize that the values in his selected forecasts are already accounted for in FPL's wide range of forecasted values.

III. B Inaccurate/Misleading Statements

Q. What is the purpose of this section of your rebuttal testimony of Witness Cooper?

A. In his 2010 testimony, Witness Cooper made a number of inaccurate and/or misleading statements (just as he did in 2009). I will present a list of such statements that pertain to FPL's 2010 feasibility analyses and to resource

planning issues. I will also explain why these statements of Witness Cooper are inaccurate and/or misleading.

Q. Please provide a listing of the statements Witness Cooper made regarding FPL's 2010 feasibility analyses and/or resource planning issues that are inaccurate and/or misleading.

A. Any list of such statements Witness Cooper made would include, at a minimum, the following 13 statements (presented in the order in which they appear in his testimony):

(1) *"...key variables that affect the economics of nuclear reactors* (include) *...declining demand due to the economic slowdown..."* (page 5, lines 1, 2, and 5) (This incorrect statement is also made in other places in Witness Cooper's testimony including page 7, line 7)

(2) *"...they still have not recognized the full implications of lowered demand in the evaluation of the proposed reactors in the timing and pattern of need for new generation assets."* (page 5, line 18 – 20)

(3) *"...they...have not dealt with the possibility that carbon taxes may be delayed..."* (page 6, lines 8 and 9)

(4) *"They use an approach to modeling the need for generation that systematically biases the results in favor of construction of nuclear reactors."* (page 6, lines 20 and 21)

(5) *"...the companies rejected the suggestion that they be required to update their economic analyses for purposes of demonstrating long-*

term feasibility, claiming that it did not make sense to let short-term changes in economic projections affect long-term decisions." (page 12, lines 6 – 9)

(6) *"This year PEF and FPL have modified their economic analyses and both now admit that building a new nuclear reactor today would be imprudent." (page 12, lines 14 and 15)*

(7) *"The cost of natural gas used in the analyses is still higher than projections by the U.S. Department of Energy Information Administration..." and "The cost of carbon is still higher than the U.S. Environmental Protection Agency projects..." (page 14, lines 19 – 22)*

(8) *"...spending hundreds of millions of dollars of ratepayer funds today so that PEF and FPL can continue..." (page 16, lines 6 and 7)*

(9) *"The companies have put a high price on carbon in their economic analyses." (page 22, lines 14 and 15)*

(10) *"...the state of Florida has not put a price on carbon, nor is it contemplating doing so." (page 22, lines 16 and 17)*

(11) *"New resources to meet the reserve margin requirement are not needed by FPL until 2037." (page 25, lines 4 and 5)*

(12) *"The uncertainty about federal policy is likely to diminish." (page 27, line 2)*

(13) *"Since FPL assumes three combined cycle units added at one time..." (page 34, line 18)*

Q. What is wrong in Witness Cooper's testimony regarding projected demand for FPL?

A. As indicated in statement (1) above, Witness Cooper repeatedly states that FPL has "declining demand." This is simply not true. He appears to be confused between the concepts of demand and the growth rate of demand. As was easily discernible from FPL's direct testimony, and as is shown in Exhibit SRS – 15, FPL projects a significant increase in peak demand of more than 5,200 MW by 2022. This projected increase reflects a lower growth rate of demand compared to prior projections.

Q. Several of the statements on the list refer to projected need for new resources. Please discuss the problems with those statements.

A. These inaccurate and/or misleading statements are:

(2) *"...they still have not recognized the full implications of lowered demand in the evaluation of the proposed reactors in the timing and pattern of need for new generation assets."* (page 5, line 18 – 20);

(4) *"They use an approach to modeling the need for generation that systematically biases the results in favor of construction of nuclear reactors."* (page 6, lines 20 and 21); and,

(11) *"New resources to meet the reserve margin requirement are not needed by FPL until 2037." (page 25, lines 4 and 5).*

Witness Cooper's erroneous statement (2) regarding "lowered demand" was just discussed above. However, it is also important to note that FPL fully accounts for its projected peak demand in its current reliability analyses in regard to both the timing and magnitude of resource needs. These analyses show that, absent new resource additions, FPL begins to have a significant need for new resources in 2022 and its cumulative need for new resources would increase every year thereafter. Projected peak demand is provided in FPL's load forecast and that forecast was previously provided in Exhibit SRS – 4. (Witness Cooper has provided no alternate load forecast for FPL.)

In regard to statement (4), Witness Cooper makes the accusation that FPL 'systematically biases its projections of resource needs to favor nuclear units.' Witness Cooper appears to again be confused by resource planning terminology and concepts. In the resource planning process, FPL first projects what its resource needs are for a given period of time. Only then, after the annual need values are established, an entirely separate analysis is carried out to determine what the best resource option is with which to meet that need.

For any given year, the MW amount needed to meet FPL's reserve margin criterion is identical for all capacity resource options (nuclear, combined cycle, etc.). Therefore, it is not possible to 'systematically bias projections of resource need to favor nuclear reactors' or to favor any other type of generation option. The selection of the type of resource option that would best

meet the resource need is a completely separate analysis that is not even addressed in projections of resource need.

In regard to statement (11), Witness Cooper claims that 'FPL needs to add no new resources to meet its reserve margin requirements until 2037.' This is curious given that FPL has demonstrated that (i) its projected reserve margin in 2021 is 19.9%, and (ii) its peak load is projected to grow significantly each year thereafter. Therefore, it is obvious that FPL needs to add a significant amount of new resources beginning in 2022 to continue to meet its 20% reserve margin requirement. Witness Cooper may once again be confused by utility resource planning terminology because he appears to be discussing a "what if" scenario he attempts to present in his Exhibit MNC – 10 in which huge amounts of energy efficiency and renewables are added to FPL's system. Energy efficiency and renewables, if added to a utility system, would be considered as new "resources" that had been added. Consequently, Witness Cooper's assertion that 'no new resources are needed' at the same time he is assuming the addition of large quantities of new resources (in the form of energy efficiency and renewables) in his own exhibit is illogical.

Q. Several of the other statements on the list refer to fuel costs and carbon costs. Please discuss the problems with those statements of Witness Cooper.

A. The inaccurate and/or misleading statements regarding these topics are:

(3) *"...they...have not dealt with the possibility that carbon taxes may be delayed..."* (page 6, lines 8 and 9);

(7) *"The cost of natural gas used in the analyses is still higher than projections by the U.S. Department of Energy Information Administration..." and "The cost of carbon is still higher than the U.S. Environmental Protection Agency projects..." (page 14, lines 19 – 22)*; and,

(9) *"The companies have put a high price on carbon in their economic analyses." (page 22, lines 14 and 15); and,*

(10) *"...the state of Florida has not put a price on carbon, nor is it contemplating doing so." (page 22, lines 16 and 17).*

In regard to statement (3) that claims that the utilities 'did not deal with the possibility of a delay in carbon taxes', FPL's 2010 feasibility analyses used an updated projection of CO_2 compliance costs that addressed not only the projected cost values, but when such compliance costs would begin to go into effect. For example, FPL's 2010 assumption for the starting date for CO_2 compliance costs for its Env I and Env II environmental compliance cost forecasts are 2018 and 2015, respectively. In comparison, the assumed starting date in FPL's 2009 Env I and Env II forecasts was 2013 for each. These five-year and two-year delays in the assumed start dates for CO_2 compliance costs are a direct result of accounting for projected delays in the assumed start dates for those compliance costs.

Statements (7) and (9) basically state that FPL's analyses used higher costs for both gas and carbon than in the forecasts selected by Witness Cooper. The implication Witness Cooper attempts to make is that FPL's analyses used only high costs for gas and carbon in order to favor the new nuclear units. However, as is clearly stated in FPL's direct testimony, FPL used three fuel cost forecasts and three environmental compliance cost forecasts in its analyses to ensure that a very wide range of these costs were accounted for in the analyses. FPL's range for both types of costs included lower costs than in the single cost forecasts that Witness Cooper selected.

In statement (10), Witness Cooper states that 'the state of Florida is not contemplating putting prices on carbon.' Although Witness Cooper does preface the statement by including the phrase "*to my knowledge*", the core point of the statement is inaccurate. Florida not only contemplated putting a cost on carbon, but began work to do so before deciding to at least temporarily suspend work to see what the federal government might impose in regard to carbon taxes.

Q. There are five statements remaining on the list that refer to a variety of topics. Please discuss the problems with those statements.

A. The remaining statements on this list are:

(5) "*...the companies rejected the suggestion that they be required to update their economic analyses for purposes of demonstrating long-*

term feasibility, claiming that it did not make sense to let short-term changes in economic projections affect long-term decisions." (page 12, lines 6 – 9);

(6) *"This year PEF and FPL have modified their economic analyses and both now admit that building a new nuclear reactor today would be imprudent." (page 12, lines 14 and 15)*;

(8) *"...spending hundreds of millions of dollars of ratepayer funds today so that PEF and FPL can continue..." (page 16, lines 6 and 7;)*

(12) *"The uncertainty about federal policy is likely to diminish." (page 27, line 2); and,*

(13) *"Since FPL assumes three combined cycle units added at one time..." (page 34, line 18).*

All of these statements rate pretty high on the "outrageous statement" meter (and, yes, I have one). Statement (5) appears to be Witness Cooper's convoluted recollection, or re-casting, of the criticism he justly received to his 2009 testimony. In that testimony, and again in his 2010 testimony, Witness Cooper selects a single 50-year low forecast for the costs of gas and carbon costs, and assumes that this single forecast is so effective in accurately predicting highly uncertain costs for a half-century that a resource decision can be made solely on the basis of that forecast without considering any other possible scenarios. In its 2009 rebuttal testimony, FPL pointed out the folly of that approach (and we do so again this year).

Witness Cooper chooses to "remember" this as the utilities broadly 'rejecting the concept of updating their economic analyses for purposes of demonstrating long-term feasibility'. Nothing could be further from the truth. The FPSC expects assumptions to be updated annually for the feasibility analyses and FPL updates its assumptions and its feasibility analyses each year for the annual NCRC docket filing.

However, FPL does reject Witness Cooper's ill-advised approach to attempt to address uncertainty for highly uncertain fuel costs and environmental compliance cost over 50 years using a single forecast. Instead, FPL's annual feasibility analyses utilize multiple fuel cost and environmental compliance cost forecasts and scenarios in its feasibility analyses to avoid the problems inherent in Witness Cooper's ill-advised approach.

In regard to statement (6) in which Witness Cooper claims that "This year PEF and FPL have modified their economic analyses and both now admit that building a new nuclear reactor today would be imprudent", Witness Cooper provides no documentation for his claim that such an admission has occurred. Furthermore, FPL's approach to economic analyses has not changed and the results of all of these economic analyses consistently support the feasibility of Turkey Point 6 & 7.

In statement (8) Witness Cooper claims that the utilities want to spend 'hundreds of millions of ratepayer dollars today'. However, Witness Cooper contradicts himself in his testimony on page 13, line 13 where he states that FPL's requested expenditures for the two-year period of 2010 and 2011 are $28 million. (The actual amount that FPL projects to spend in 2010 and 2011 is approximately $72 million). This two-year amount is significantly lower than the 'hundreds of millions' of dollars he claims in statement (8) that FPL 'wants to spend today'.

In statement (12), Witness Cooper states that 'uncertainty regarding federal policy is likely to diminish'. When one considers the many aspects of federal legislation and regulation which could affect all types of resource options over the next half-century, there is simply no way that uncertainty regarding all of these potential federal actions will diminish anytime soon.

Finally, Witness Cooper claims in statement (13) that FPL used an assumption of 'adding three combined cycle units at one time' in its 2010 feasibility analyses. This statement is incorrect. My direct testimony, page 30, lines 9 and 10, reads as follows: "The Resource Plan without Turkey Point 6 & 7 adds two 1,212 MW CC units, one in 2022 and one in 2023." This appears to be another instance in which Witness Cooper is confused by utility terminology and concepts. Exhibit SRS – 9 in my direct testimony shows that in those two years, the Resource Plan without Turkey Point 6 & 7 adds a

"Greenfield 3 x 1CC (1,212 MW)". In this common form of describing the design of CC units, the "3" denotes that this particular configuration of a CC unit has three combustion turbines, not that FPL is adding three combined cycle units.

Witness Cooper's failure to understand this terminology for CC units is also reflected in analyses that he attempts to perform. I will turn to this topic in the next section of my rebuttal testimony.

Q. Please summarize this portion of your rebuttal testimony that addresses the inaccurate and/or misleading statements made by Witness Cooper.

A. As evidenced by the preceding discussion, there are quite a number of inaccurate and/or misleading statements that Witness Cooper has made in his 2010 testimony. And, when considering the volume of these inaccuracies and misleading statements, one should keep in mind that my review was focused solely on those statements in which he addressed FPL's 2010 feasibility analyses and resource planning issues. Other FPL witnesses will address similarly inaccurate and/or misleading statements regarding other aspects of Witness Cooper's testimony. Furthermore, the range of resource planning topics for which he has made inaccurate and/or misleading statements is extensive. This fact, combined with a number of his specific statements, point out that Witness Cooper is not only unfamiliar with the FPL's 2010 feasibility analyses, but that he is unfamiliar with a number of basic resource planning terms and concepts.

III.C Problems with His "Analyses" and Exhibits

Q. What is the purpose of this section of your rebuttal testimony?

A. In his 2010 testimony, Witness Cooper refers to 'analyses' he performed and he provides the results of those analyses as exhibits to his testimony. This portion of my rebuttal testimony will review some of those exhibits to demonstrate the numerous errors that are prevalent in Witness Cooper's work.

Q. Which exhibit will you discuss first?

A. Because resource planning work typically starts with a discussion of projected load and resource needs for a utility, the first exhibits that will be reviewed are his Exhibits MNC -10 and MNC - 11.

There are a number of errors in these exhibits. The first error is the title of Exhibit MNC – 10: *"Declining Peak Load Projections"*. In contradiction to his title, the highest line on the graph (labeled as *"Base"*) shows a steadily increasing Summer peak load (MW) for FPL. This line reflects FPL's current forecast of future peak demand on its system and it clearly shows that FPL's projected peak load does not decline. Therefore, his first error is an incorrect and misleading title to the exhibit.

His next error comes after he introduces two curves in which he apparently started with FPL's projected peak load and then attempts to reduce this forecast of FPL-specific Summer peak MW load. Witness Cooper appears to

attempt to reduce the FPL-specific forecasted MW using *"efficiency"* and *"renewables"* information in his referenced EPA document page 38. Even before examining the EPA information he used, an error has been made. That error is in choosing to information from EPA (or from any other source) that is not specific to FPL's service territory or utility system. Any such non-FPL-specific information should not be used to modify an FPL-specific forecast of peak MW load. Information that is not specific to FPL's service territory does not address the weather, electricity use patterns, applicable equipment, etc., that was used to develop the FPL-specific load forecast. Therefore, the two curves he produces using non-FPL-specific information to adjust an FPL-specific Summer peak MW forecast are meaningless.

(For purposes of the discussion that follows, I will quickly discuss some resource planning terminology. One of the first steps utilities make in developing a projection of future resource needs is to adjust their peak MW load forecast by subtracting the projected MW amount of demand side management. The result is what is called a forecast of "firm peak" (MW) load that the utility will need to serve. It appears that this is what Witness Cooper attempted to do in developing the bottom two curves on this exhibit.)

The next error on his Exhibit MNC – 10 is in the choice of EPA data to use. On the page of the EPA document he references (page 38), there are no numeric values for *"efficiency"*. There are numeric values for

"Renewables/Other". However, the information presented on this page does not represent a reduction in peak load (MW) demand. If it had, and if one were to ignore the fact that a calculation was incorrectly being made by combining FPL-specific load data with other non-FPL-specific data, then Witness Cooper could have at least tried to represent the results of his calculation as a "firm peak" (MW) load forecast for FPL. However, the EPA information does not represent peak load (MW) reduction, but represents a projected amount of energy (MWh) which might be generated by "Renewables/Other". Even the title of this page, "Electricity Generation Mix", points out that what is being discussed is electricity generation, not load reduction. This energy generation information is presented in terms of terawatt hours (TWh, where 1 TWh equals 1,000,000 MWh). Even if Witness Cooper attempts to perform some translation of MWh to MW, utilities do not perform projections of resource need by taking the MW of projected peak demand and subtracting an amount of generation capacity. Such a scheme is clearly not the industry-accepted approach to projecting a utility's resource needs.

Furthermore, Witness Cooper's calculations for this exhibit show no evidence that he even attempted to perform a translation of energy (MWh) to demand (MW) using the non-FPL-specific data from the referenced EPA document page. Instead, he appears to have selected various, arbitrary 'MW percentage reduction values' which he attempts to apply to FPL's actual MW forecast.

These arbitrary percentage values are neither supported by the referenced document page nor by his calculation document.

The errors continue with his associated Exhibit MNC – 11. Because his starting point for Exhibit MNC – 11 is the already discredited Exhibit MNC – 10, all of the information in Exhibit MNC -11 is meaningless. However, there are other problems with this associated exhibit. Witness Cooper repeats his error of using an incorrect and misleading title for the exhibit; i.e., there is no *"Declining Peak Load"*. Furthermore, neither of the curves on the graph even present the projected peak load. He then makes another error by introducing a new term to the graph, *"Firm Capacity"*, which is the description for one of the two curves on this exhibit. His footnote cites Exhibit SRS – 4 as the source for the FPL-specific information, but none of my exhibits, including Exhibit SRS – 4, provides a projection of FPL's firm capacity. (Perhaps Witness Cooper is again confused by utility resource planning terminology with the confusion this time being between the concepts of "firm peak" and "firm capacity".)

The final error on this exhibit is in his calculation of the second curve in the graph labeled as *"Capaicity* (sic) *Required for 20% Reserve."* Because of the errors in logic he made with Exhibit MNC – 10 in trying to combine FPL-specific peak load (MW) information with non-FPL-specific generation energy (MWh) information, his calculation of 'capacity needed to meet 20%

reserves' on Exhibit MNC – 11 is meaningless. (In addition, because of this error in logic, any use of the results from Exhibit MNC -11 that he might have made in later analyses will render the results of the later analyses meaningless as well.)

Q. What is the next exhibit of Witness Cooper that you will discuss?

A. Exhibit MNC – 17 is discussed next because the errors Witness Cooper made in this exhibit are carried over and repeated in other exhibits, thus rendering those associated exhibits meaningless as well. Witness Cooper again makes several errors in developing this one simple exhibit.

His first problem is his referencing of the source of the FPL data in the exhibit. The reference he provides is, at least, misleading. Witness Cooper states that the source is FPL's *"Response to Staff's Second Set of Interrogatories, Interrogatory No. 64, p.7."* Staff has not issued such an interrogatory for this year's docket. The information he used appears to have been provided in the response to the 7th set of interrogatories issued last year (in 2009). Therefore, Witness Cooper's misleading reference masks the fact that he is using outdated information from 2009.

The fact that the information Witness Cooper is using is last year's data is the second error in this exhibit. This is a fundamental error that makes the information Witness Cooper is attempting to convey with this exhibit (and

with other exhibits that use the same approach and information as Exhibit MNC – 17) utterly meaningless for purposes of this year's docket.

The FPSC has provided specific guidance in regard to assumptions and data that are to be used in the annual feasibility analyses that are presented in the NCRC dockets. That specific guidance is to use data and assumptions that have been updated from the previous year. In compliance with that guidance, FPL has updated all of its forecasts and assumptions for its 2010 resource planning work, thus resulting in a completely updated 2010 feasibility analyses for purposes of this docket.

However, Witness Cooper has chosen to ignore the FPSC's guidance and simply used data and assumptions from the previous year. In so doing, he has chosen to use capital expenditure patterns and in-service dates for both his *"Nuclear base"* and *"Gas base"* curves that are no longer applicable for either Turkey Point 6 & 7 or the competing CC units. Consequently, the first two curves on this graph are meaningless for the purpose of this docket.

Q. Witness Cooper includes a third curve entitled *"Gas Delay"* in this exhibit. Are there also problems with this curve?

A. Yes. There are two major problems with this curve as well. First, because this curve is directly based on the outdated data in his *"Gas base"* curve, this third curve also conveys no meaningful information. That alone is enough to close the book on this exhibit (and the other associated exhibits that use data from

this exhibit). However, it is instructive to examine a second major error that he made when he created the third curve.

In creating the third curve, Witness Cooper apparently based his actions on his incorrect assumption that FPL's Resource Plan without Nuclear was building 3 CC units in each of the years 2022 and 2023. (This incorrect assumption was discussed earlier.) Then, for the purpose of his totally misguided analysis, Witness Cooper decided to create a *"Gas Delay"* case by assuming that he would build only 1/3 as many gas units as he believes FPL was building. (Note that it appears he did not take into account reserve margin requirements to see if 1/3 less capacity would still allow FPL to meet its 20% reserve margin criterion. It would not.)

Witness Cooper then tried to develop a set of lowered system capital costs for his *"Gas Delay"* (or '1/3 gas case') curve. Incredibly, Witness Cooper decided it was somehow appropriate to simply divide the projected total system capital costs for the entire period of 2008 through 2018 in the second curve by a factor of 3.

Witness Cooper disregards the fact that construction expenditures for a CC unit that would go in-service in 2022 would not begin until around 2020. In his haste, he divided the projected capital costs for all of FPL's capacity additions, beginning in 2008, by a factor of 3. In doing so, he has disregarded

the fact that capital expenditures prior to 2020 pertain to other resource additions completely unrelated to resource additions made beginning in 2020. As a result, Witness Cooper arbitrarily reduces the costs of projects that have been approved and are already being developed. Therefore, his third curve reflects that the cost of the EPU project is reduced by a factor of 3, the costs of the modernization at Cape Canaveral are reduced by a factor of 3, etc. Resource planning, obviously, is more complicated than Witness Cooper implies.

This approach to resource planning and cost projections is clearly nonsensical and, if possible, renders his Exhibit MNC – 17 even more meaningless. Furthermore, because he carries over the '1/3 gas plan' into Exhibits MNC – 15 and MNC – 16, these other two exhibits are also rendered meaningless.

Q. **This discussion listed the following errors in Witness Cooper's Exhibit MNC – 17: (i) disregarding the FPSC's guidance in his use of the previous year's outdated data, (ii) providing an incorrect reference source, (iii) incorrectly assuming that the amount of CC capacity added beginning in 2022 should be reduced by a factor of 3, and (iv) incorrectly reducing FPL's projected total system capital revenue requirements dating back to 2008 by a factor of 3 (due to an incorrect assumption that would not even have an impact until around 2020). Are all of these errors also included in his Exhibits MNC – 15 and MNC – 16?**

A. Yes.

Q. Do these two exhibits contain any additional errors?

A. Yes. I will discuss three additional errors. First, the title of both exhibits states that the values shown are discounted annual revenue requirements using a *"2010 discount rate"*. However, the y-axis on each exhibit labels the values as being in nominal dollars. Clearly, one of these designations is wrong and what the graphed values actually represent, nominal dollars or present value dollars, is unknown.

Second, assuming that the values are really supposed to represent present value dollars, Witness Cooper has now taken nominal dollars from the previous year's (2009) analyses, then has applied this year's (2010) discount rate to those dollars. This is clearly an incorrect mixing of assumptions. In particular, the nominal annual capital revenue requirements that were projected in last year's analysis were based on a specific set of cost of capital assumptions. Those assumptions allow one to derive an appropriate discount rate consistent with that set of data. Witness Cooper's attempt to arbitrarily impose an unrelated new discount rate into an analysis of these same nominal annual revenue requirements creates an obvious inconsistency.

The third error occurs on Exhibit MNC – 15 and it, to me, is the most interesting error. Witness Cooper introduces a new case titled *"Ten Year Delay"*. Presumably, this refers to a 10-year delay in FPL adding any form of new resources. Witness Cooper then projects that this new case will result in

FPL having absolutely zero annual revenue requirements for 10 years! (This is shown on the graph by the fact the *"Ten year delay"* curve is on top of the $0 cost line for 10 years.) In other words, Witness Cooper's new case projects FPL as having no costs for 10 years. (I am not sure if this means he believes FPL would be incredibly profitable, or that it would be out-of-business, for those 10 years.)

Clearly, this is another nonsensical result (and should have resulted in warning alarms going off for Witness Cooper as he reviewed his exhibit.).

Q. Do you have any comments about Witness Cooper's exhibits MNC – 6, 7, and 12 that, respectively, address natural gas costs, CO_2 costs, and gas cost *"volatility"*?

A. Yes. In regard to his Exhibits MNC – 6 and MNC -12 in which he selects a single gas cost forecast, and a single CO_2 cost forecast, respectively, I have already discussed the folly of using a single cost forecast for these highly uncertain factors. Also, the fact that FPL's multiple cost forecasts already account for Witness Cooper's selected single forecasts has been discussed. Therefore, there is no need for further discussion of these two exhibits.

However, I will briefly discuss his exhibit MNC – 7 which he presents as 'proof' that natural gas price *"volatility"* is a thing of the past. His exhibit compares actual historical prices with (again) a selected single gas price forecast, plus some straight lines representing the future. He first shows that

gas prices have fluctuated a great deal in the recent past. Then he implies that, according to his selected single low gas price forecast (and his straight lines), gas cost volatility will certainly be minimal in the future.

His conclusion is less than persuasive. There have been a number of "drivers" for the relatively recent fluctuations in natural gas prices. Included among those drivers are weather (such as very cold winters) and natural disasters (such as Hurricane Katrina). Forecasts of natural gas prices that were produced in the 1990s and early 2000s did not predict, and could not have predicted, such occurrences with any meaningful level of accuracy. Thus those previous forecasts were not accurate predictors of the much higher gas costs that actually occurred. Similarly, forecasts of natural gas prices made today will not be accurate predictors of the future effects of weather and natural disasters (along with other potential drivers) on natural gas costs.

In addition, because FPL's system is already highly dependent upon natural gas that is delivered by only two natural gas pipelines down a long peninsula, even relatively small jumps in natural gas costs and/or disruptions in gas availability can have a quite a negative impact on FPL's customers.

Q. Please summarize this portion of your rebuttal testimony?

A. Witness Cooper attempted to perform some resource planning-type analyses in his testimony this year, just like he did in 2009. And, just like last year, Witness Cooper made numerous errors in both logic and execution in his

analyses. Consequently, the analysis results that he presents in (at least) Exhibits MNC – 10, 11, 15, 16, and 17 are incorrect and meaningless. In addition, his Exhibits MNC – 6, 7, and 12 are completely unconvincing as Witness Cooper labors to persuade us that natural gas and CO_2 cost can definitely be counted on to remain low for the next 50 years.

III.D No Economic Analyses and Other Considerations

Q. What will you be addressing in this section of your rebuttal testimony?

A. I will be addressing the fact that Witness Cooper has not offered any economic analyses of the Turkey Point 6 & 7 project that uses updated 2010 assumptions. My testimony also addresses several other considerations regarding Witness Cooper's testimony including a look at his preferred alternatives to nuclear: energy efficiency and renewable energy.

Q. Did Witness Cooper offer any updated economic analyses of the Turkey Point 6 & 7 project?

A. No. As discussed in the previous section of this testimony, Witness Cooper primarily attempted to use outdated information from last year's filing in various calculations. And, as was also discussed, he made numerous errors in his calculations. For both of these reasons, the results of his "analyses", which are presented in a number of his exhibits, are meaningless. Consequently, Witness Cooper offers no economic analyses of the Turkey Point 6 & 7 project that uses updated assumptions.

Q. Did Witness Cooper attempt any other type of "economic analysis"?

A. No. Witness Cooper only made two very brief references to the busbar costs of his preferred alternatives. These busbar cost estimates for generic, non-Florida-specific energy efficiency and renewables were prepared by other parties several years ago.

As previously discussed in my review of Witness Gundersen's testimony, a detailed explanation of why a busbar cost approach is a totally unacceptable method for decision-making regarding resource options is included as Exhibit SRS – 14 to my rebuttal testimony. Consequently, the busbar cost references offered by Witness Cooper are meaningless for the purpose of this docket.

Q. In regard to energy efficiency and renewables, are there any aspects of Witness Cooper's testimony that you would like to comment on?

A. Yes. I will focus on the complaint Witness Cooper has that (paraphrasing) 'FPL used natural gas prices and carbon costs that are too high, thus making new nuclear units economically attractive'. To counter this, Witness Cooper attempted to introduce a single low gas and carbon cost forecast which, he believes, provides lower costs than what FPL assumed. Witness Cooper introduces lower cost forecasts presumably with the objective of lowering the economic advantage that is being projected for new nuclear units in FPL's 2010 feasibility analyses.

Yet Witness Cooper appears not to recognize that there would be at least two counterproductive (for his objective) consequences with an assumption of lower fuel and carbon costs. First, the economic attractiveness of his preferred resource alternatives, energy efficiency and renewables, would also generally be lowered as well by his assumptions of low gas and carbon costs. Second, with low fuel and carbon costs, electricity prices will be lower, thus increasing the demand for electricity. As a consequence, FPL would face even higher demand growth, and even greater resource needs, than it currently projects.

Q. Are there any other aspects of Witness Cooper's testimony regarding efficiency or renewables that you will address?

A. Yes. The list of renewable options presented by Witness Cooper in his Exhibit MNC – 14 consists of four renewable technologies: photovoltaics (PV), concentrating solar power, geothermal, and wind. However, of these four types of renewable technologies, only two (PV and concentrating solar) are considered to be widely applicable in Florida. FPL has one of the world's largest PV facilities (25 MW) at its DeSoto site, as well as a 10 MW PV facility in Brevard County. FPL also has a large concentrating solar thermal facility at its Martin plant. However, these PV and concentrating solar facilities are currently considered to be intermittent, non-firm energy sources and do not contribute to meeting FPL's reserve margin criterion.

Whatever federal or state statutory requirements may be imposed in the future regarding the energy (MWh) contribution from renewable resources, such

requirements do not change the fact that these renewable resources will provide relatively little, if any, firm capacity (MW). Nuclear generation is the only large-scale source of firm capacity that has zero CO_2 emissions.

Consequently, regarding Witness Cooper's preferred two types of resource options, energy efficiency and renewables, he has provided no meaningful economic analyses regarding either option in comparison to new nuclear units. His testimony has introduced only two renewable energy sources (PV and concentrating solar) which are widely applicable in Florida and which FPL is already implementing. However, these renewable options do not help meet FPL's future resource needs because of the non-firm nature of their output. Conversely, new nuclear units will, if constructed, produce firm capacity and will help meet FPL's future resource needs.

Q. Is there any other aspect of Witness Cooper's comments regarding carbon costs that you would like to comment on?

A. Yes. Witness Cooper's complaint that FPL's assumed CO_2 compliance costs are too high, and his suggestion to substitute a low carbon cost forecast he selected for use in this specific docket, raise another issue. I view these actions as a transparent attempt to use only low carbon costs in order to lower the projected economic advantages of new nuclear units.

When FPL updates its assumptions, including its assumptions for CO_2 compliance costs, those assumptions are then typically used in FPL's resource

planning work for all resource options (nuclear, solar, combined cycle, etc.) until the assumptions are again updated. FPL does not select a particular environmental compliance cost forecast or fuel cost forecast with which to evaluate each specific resource option. Such an approach could be questioned as an attempt to bias the analysis either for or against that particular resource option.

Witness Cooper's call to use only a low carbon cost forecast in the current analysis of new nuclear units raises this question not only for him, but for the SACE organization he is representing. In regard to SACE, they were represented in the recent DSM Goals docket by another witness who strongly argued that FPL's CO_2 compliance costs were far too low. In that docket, SACE Witness Steinhurst's testimony stated in regard to FPL's CO_2 compliance cost forecast that *"I consider those values to be at the extreme **low end** of the reasonable range of estimates..." (page 22, lines 13 and 14)* (emphasis added). Exhibit SRS-16 points out SACE's inconsistency regarding the same FPL projection of CO_2 costs.

It is clear that these two witnesses who were/are representing SACE do not agree with each other regarding projected carbon costs. More to the point, it is also evident that SACE has no problem in taking one position – projected carbon costs should be higher – when higher carbon costs are beneficial to one of SACE's objectives (justifying more DSM in the DSM Goals docket), yet

has taken the opposite position – projected carbon costs should be lower – when lower carbon costs are beneficial to another objective (stopping development of new nuclear units in Florida in NCRC dockets.)

I believe that SACE's approach of selective assumptions for resource analysis and decision-making is inappropriate and should not be accepted or relied upon by the FPSC. FPL's approach of using one set of assumptions for analyses of all types of resource options is by far the superior approach to resource option analysis.

Q. Early in his testimony on page 4, lines 17 and 18, Witness Cooper states that *"...the Commission should develop a comprehensive and careful template for evaluating the build-no-build decision..."* What is your reaction to that statement?

A. In regard to FPL, I believe that a template has already been established and has been in use since 2007. The analytical approach that was first utilized in the 2007 Determination of Need filing for Turkey Point 6 & 7, and which has been used in each subsequent NCRC docket with updated assumptions, provides just such a template.

Q. Near the end of his testimony on page 37, lines 4 - 17, Witness Cooper appears to caution the FPSC that if *"...the Commission is convinced to increase the ROE, then the long-term feasibility analyses required as part of this docket should be revisited, because both the changed ROE and discount rates will affect the results."* What is your comment to this statement?

A. First, if the FPSC decides to increase FPL's ROE at some point in the future, such a decision would not affect *"this"* (i.e., 2010) docket. Second, FPL's 2010 feasibility analyses have already provided a view of what the potential impacts of an increased ROE, and a corresponding change in discount rate, might be. As indicated in FPL's direct testimony, a full set of sensitivity analyses was performed utilizing an increased ROE value of 11.75% along with a corresponding higher discount rate.

Consequently, Witness Cooper appears to be advising the Commission that FPL's 2010 feasibility analyses are appropriately providing projected results using a range of assumptions.

Q. In his testimony this year, Witness Cooper again states that FPL should incorporate the 'entirety' of federal policy regarding global warming/climate change in its feasibility analyses. What is your response to that?

A. My response this year is the same as my response last year. When federal and/or state laws and regulations actually exist regarding global warming/climate change, all of FPL's resource planning activities will take into account all known aspects of those laws and regulations. However, until actual laws and regulations exist, all any of us have at this time is a proposed piece of legislation. And, as Witness Cooper again points out, the proposed legislation includes *"...an elaborate scheme of allowances..." (page 23, line 7)* plus a multitude of other facets.

The proposed piece of legislation that Witness Cooper refers to is H.R. 2454 that passed one House of Congress approximately a year ago. In the intervening year, no accompanying proposed piece of legislation has passed the Senate. In other words, in regard to proposed global warming/climate change legislation, the situation basically remains where it was last year when the 2009 NCRC docket was before the FPSC. This helps to point out that it would be counterproductive to attempt to address very complex proposed legislation in resource planning analyses as he suggests. There are simply too many unknowns: will any such law actually be passed, what will the law ultimately say, what regulations will then be imposed as the law goes into effect, what changes to the law or regulations will subsequent legal action result in, etc.

FPL assumes that some CO_2 compliance cost will go into effect in the future. Because those costs are unknown, FPL uses three cost forecasts (a high cost forecast, a medium cost forecast, and a low cost forecast) to provide a wide range of potential compliance costs with which resource options can be evaluated. The approach that FPL has taken is a logical and appropriate one.

Q. Please summarize this portion of your rebuttal testimony that addresses other statements made by, or concepts underlying the testimony of, Witness Cooper.

A. Witness Cooper failed again this year to provide any actual economic analyses of the Turkey Point 6 & 7 project. Instead, he first uses outdated information

for various calculations in which he makes numerous errors. He then makes two brief references to generic busbar cost estimates of other resource options that were developed by others some years back. My testimony points out that a thorough explanation was provided in last year's docket of why a busbar cost approach is wholly inadequate for making decisions about resource options. That explanation is again provided in Exhibit SRS – 14.

In regard to his attempt to substitute a selected single low forecast for gas and carbon costs in place of FPL's multiple forecasts in an attempt to lower the projected economic advantage of new nuclear units, Witness Cooper fails to adequately discuss (and perhaps to recognize) that this would have other consequences. Lower gas and carbon costs would also make energy efficiency and renewables less economically attractive. Furthermore, the resulting lower prices for electricity would increase demand for electricity and increase FPL's projected need for new resources.

He expresses a preference for renewables instead of nuclear, but his list of four types of renewables includes two that are not widely applicable in Florida. As for the other two types (PV and concentrating solar), FPL strongly supports and pursues the implementation of both in Florida as part of a balanced portfolio approach that includes nuclear energy. However, both PV and concentrating solar are currently considered to be intermittent, non-firm

energy sources and, therefore, do not contribute to FPL's reserve margin while nuclear units' firm capacity does contribute.

This attempt by SACE Witness Cooper to substitute a selected low forecast for the analysis of one specific resource option (new nuclear units), in place of FPL's updated range of forecasts that are typically used in its resource planning work, is not an appropriate approach to resource planning and decision-making. SACE's witnesses have used this "selective" assumption approach in several recent dockets before the FPSC. SACE's practice is inappropriate and should not be accepted or relied upon by the FPSC.

Witness Cooper calls for the FPSC to establish a 'template' with which to base its decisions on and to consider in the future that changes in ROE and discount rates may impact annual feasibility analyses. However, the FPSC already has a template consisting of these annual feasibility analyses that has been in use since 2007. FPL's analytical approach has consistently provided a comprehensive set of analyses using a very broad range of updated forecasted costs for fuel and environmental compliance costs. In addition, the analytical approach is a flexible one. That flexibility was shown this year by the inclusion of a full set of analyses using a different scenario of ROE and discount rate values.

Witness Cooper again this year calls for FPL to consider the *entirety* of federal policy regarding global warming/climate change. But the reality is that no such federal policy has been established. All that currently exists is pending legislation that passed one House of Congress approximately one year ago. No companion bill has since passed the Senate, no reconciliation of the two bills has occurred, no bill has been signed into law, no regulations regarding the bill have been developed, and no court challenges to the law and its regulations have been decided upon.

Because of this, it is inappropriate to attempt to address 'the entirety' of proposed legislation in resource planning analyses. FPL's approach to accounting for uncertainty with a broad range of CO_2 compliance costs is an appropriate approach to take at this time and until actual laws exist. FPL's analyses will account for all aspects of any such policy once actual laws and/or regulations exist.

III.E. Where Witness Cooper Agrees with FPL's Approach

Q. Does Witness Cooper's testimony show evidence that he either recognizes the potential importance of new nuclear capacity or agrees with FPL's careful, stepwise approach to pursuing new nuclear units?

A. The answer to both questions is "yes".

Q. What evidence do you find in Witness Cooper's testimony that he recognizes the potential importance of new nuclear capacity?

A. Let me first state that if global warming/climate change legislation does become law, it seems highly unlikely that the law would not provide significant encouragement for the implementation of new nuclear units. After all, it is the only resource option that exists which can provide firm capacity and energy at capacity factors in the 90% range with zero CO_2 emissions. How could any serious attempt be made to address potential global warming/climate change that did not make use of the one available tool, nuclear energy, which can most lower CO_2 emissions?

Witness Cooper recognizes this point in his testimony. On page 25, lines 17 through 21, he makes the following statement about what would occur if the pending legislation became law: *"Under the pending legislation, the entire industry will be working on the problem, as will the public sector institutions. A full range of alternatives will be examined including more efficiency and renewables,...new forms of storage,...expanded transmission that improves access to out of territory renewables, carbon capture and storage, and* ***nuclear generation****"* (emphasis added). By inclusion of this statement in his testimony, Witness Cooper clearly does not believe that nuclear generation will somehow be excluded from consideration by the pending legislation. And, in regard to 'the entire industry and public sector will be examining a

full range of alternatives', FPL's on-going approach to examining new nuclear units at Turkey Point is entirely supportive of that objective.

Q. Did your review find evidence of support for FPL's stepwise approach towards new nuclear units in Witness Cooper's testimony?

A. Yes. Witness Cooper made two other statements I found to be supportive of FPL's on-going approach towards new nuclear units. The first statement is *"...is very valuable because it keeps options open"* (page 25, lines 22 and 23). The second statement is: *"...the prudent choice would be to avoid rigid, expensive choices, especially if there is time to let the uncertainties diminish before decisions must be made."* (page 29, lines 22 and 23).

With these two statements in mind, let's review what FPL's approach to new nuclear units is, and has been from the start. FPL's approach is to proceed carefully and deliberately, step-by-step in its analyses. The first major step was to acquire FPSC approval to proceed with this approach. Based on the careful, stepwise nature of FPL's approach, and the enormous potential benefits that new nuclear units have for FPL's customers, this approval was granted (and the progress to-date is reviewed each year by the FPSC).

The second major step is to determine if new nuclear units using the technology selected by FPL can be licensed and permitted at the Turkey Point site. The only way to determine this is to seek approval for these licenses and permits. Attempting to obtain this license retains the option of new nuclear

units and, as evidenced Witness Cooper's first statement, he agrees that it is important to keep options open.

Witness Cooper's statement to avoid or delay 'rigid choices' is consistent with the careful, stepwise approach FPL is taking with respect to Turkey Point 6 & 7 and the FPSC's ongoing opportunity to consider, each year, the evidence with respect to proceeding with the project. In addition, the question of whether a license for the Turkey Point 6 & 7 project will be approved is the next major 'uncertainty' referred to in Witness Cooper's statement. In the several years before an answer to the licensing question is answered, FPL and the FPSC will have more information regarding a number of assumptions and forecasts that represent other 'uncertainties" in Witness Cooper's statement.

Therefore, FPL's deliberate, stepwise approach towards the Turkey Point 6 & 7 project appears wholly consistent with Witness Cooper's description of the 'prudent choice' for how to approach new nuclear units.

IV. Concluding Remarks

Q. Does the FPSC's Order in last year's NCRC docket provide support for FPL's approach in addressing forecasted fuel and carbon costs in its 2010 feasibility analyses?

A. Yes. FPSC Order No. 090009-EI makes the following statement on page 15 regarding fuel/gas cost forecasting for feasibility analyses: "We believe there is inherent uncertainty surrounding fuel forecasting" and "Reviewing the TP67 project feasibility using a range of long-term fuel forecasts reasonably accounts for the volatility in the natural gas market."

Also on page 15, the Order states the following in regard to carbon cost forecasting for feasibility analyses: "There is uncertainty regarding the future legislation of carbon dioxide (CO2), as well as potential issues regarding the timing of filing requirements and on-going legislation. Providing a range of CO2 forecasts is reasonable until legislation is enacted."

The approach in addressing forecasted fuel and carbon costs that was used by FPL in 2009, and which is supported in this Order, is the same approach that is used in FPL's 2010 feasibility analyses (and which has been used in FPL's Determination of Need filing and all subsequent NCRC dockets.)

Q. Prior to concluding your testimony, what else would you like to add?

A. I will focus my concluding remarks on the views expressed by Witnesses Gundersen and Cooper. The objective of their testimonies is clear: stop any further analysis of the option of new nuclear units. Their testimonies give absolutely no evidence that they have given any consideration to the enormous potential benefits that new nuclear units could provide if the units are built. On the other hand, their testimonies do not seriously dispute FPL's

projection of the magnitude of these potential benefits. Instead, Witnesses Gundersen and Cooper focus most of their attention solely on the "costs" of nuclear in an effort to persuade the FPSC from allowing FPL to continue to pursue an option with enormous potential benefits for FPL's customers.

These two witnesses are entitled to their opinions and to their biases. However, they are not the ones charged with providing safe, reliable electricity to FPL's customers at a reasonable cost. FPL has that responsibility and takes it seriously. As a result, FPL has continued to analyze a wide variety of resource options over the years. Those analyses earlier led to the construction and operation of FPL's four existing nuclear units which save FPL's customers approximately $1 million per day per unit, thus amounting to billions of dollars in fuel savings and environmental compliance cost savings for FPL's customers since the units went into operation.

FPL continues to improve and diversify its resource portfolio through the following actions:

- the addition of a number of highly efficient, natural gas fired CC units;
- the repowering and modernization of older, existing steam units;
- expansion of one of the nation's largest and most effective utility DSM efforts;

- installing the maximum amount of renewable energy capability that is currently allowable, including the addition of one of the world's largest PV facilities;
- placing a number of older, less efficient units on Inactive Reserve until the capacity from these units is again needed;
- continuing its work to cost-effectively enhance the generating capability of FPL's four existing nuclear units; and,
- continuing its work to obtain the option for the future construction and operation of new nuclear units.

FPL recognizes that the future holds many uncertainties. For that reason, FPL believes the prudent course of action is to thoroughly examine and actively pursue all promising resource options. The examination of new nuclear units has begun, but it is not completed. As mentioned earlier in my testimony, the next major step in this examination is to determine whether FPL can obtain the licenses and permits necessary for constructing and operating the new nuclear technology selected by FPL at the Turkey Point site.

FPL's 2010 filing in this docket seeks approval to continue work in 2010 and 2011 in a deliberate, stepwise approach to continue to seek those licenses and permits. FPL's 2010 feasibility analyses continue to project that Turkey Point 6 & 7 can be very cost-effective additions for FPL's customers through at least 2063.

As explained in the direct testimony of FPL Witness Scroggs, the amount of money that FPL is requesting approval of in this docket to continue its work on the Turkey Point 6 & 7 project is approximately $72 million for the two-year period of 2010 and 2011. This amount of money in those years represents a reasonable investment given that the projected total fuel savings alone for FPL's customers over the life of the two nuclear units is approximately $95 billion. The examination of such a promising resource should be continued.

Q. Does this conclude your rebuttal testimony?

A. Yes.

Scenario Analysis of FPL's EPU Project Using Witness Jacobs' "What If" Cost Assumption

Total Cost Differentials for All Fuel and Environmental Compliance Cost Scenarios in 2010$ (millions, CPVRR, 2010 - 2043)

Assumptions:

Witness Jacobs' assumed additional construction cost ($ millions) =	
CPVRR Factor =	
CPVRR Additional Cost ($ millions) =	[redacted]

		Base Analyses (10.0% ROE)		Sensitivity Analyses (11.75% ROE)	
		(1)	(2)	(3)	(4)
		FPL's Analyses	"What If" Analyses	FPL's Analyses	"What If" Analyses
Fuel Cost Forecast	Environmental Compliance Cost Forecast	Total Cost Difference Plan with Nuclear Uprates minus Plan without Nuclear Uprates (2010$)	Total Cost Difference Plan with Nuclear Uprates minus Plan without Nuclear Uprates (2010$)	Total Cost Difference Plan with Nuclear Uprates minus Plan without Nuclear Uprates (2010$)	Total Cost Difference Plan with Nuclear Uprates minus Plan without Nuclear Uprates (2010$)
High Fuel Cost	Env I	(1,474)	(1,151)	(1,079)	(756)
High Fuel Cost	Env II	(1,660)	(1,337)	(1,244)	(921)
High Fuel Cost	Env III	(2,055)	(1,732)	(1,595)	(1,272)
Medium Fuel Cost	Env I	(942)	(619)	(604)	(281)
Medium Fuel Cost	Env II	(1,129)	(806)	(771)	(448)
Medium Fuel Cost	Env III	(1,524)	(1,201)	(1,121)	(798)
Low Fuel Cost	Env I	(417)	(94)	(137)	186

Note: A negative value indicates that the Plan with Nuclear Uprates is less expensive than the Plan without Nuclear Uprates. Conversely, a positive value indicates that the Plan with Nuclear Uprates is more expensive than the Plan without Nuclear uprates.

BEFORE THE GEORGIA PUBLIC SERVICE COMMISSION

In the Matter of:	
Review of Proposed Revisions and Verification of Expenditures Pursuant to GEORGIA POWER COMPANY's Certificate of Public Convenience and Necessity for Plant Vogtle Units 3 and 4	Docket No. 29849

Hearing Room
Georgia Public Service Commission
244 Washington Street
Atlanta, Georgia

Wednesday, December 16, 2009

The above-entitled matter came on for hearing pursuant to Notice at 10:10 a.m.

BEFORE:

DOUG EVERETT, Chairman
LAUREN McDONALD, Vice Chairman
CHUCK EATON, Commissioner
STAN WISE, Commissioner
ROBERT B. BAKER, JR., Commissioner

not correct?

WITNESS JACOBS: That's correct. And many of them will be neutral, it will be a change in scope trade off with no cost impact.

BY MR. PRENOVITZ:

Q You said the consortium does that, the consortium is Stone and Webster and Westinghouse?

A (Witness Jacobs) Yes.

Q Basically? And they are -- just so I understand the process, while they're evolving in the process and so on, they identify potential problems and so on hence that causes a change order, is that right or -- what drives a change order? I mean, why do they do it? Why do they recommend it?

A (Witness Jacobs) It -- as situations come up that was not anticipated in the EPC contract or is not as the project was planned in the EPC contract.

Q In Georgia Power's economic analysis, you make reference to the fact that they ignore sunk costs and also they said they ignore the weighting of various factors. I think that's page 25. Could you kind of elaborate on that, please? And why that matters or doesn't matter?

A (Witness Hayet) The point there is just to point out that the economic analysis as you go forward with the project, the question that you have to answer is what are

the future costs that will be incurred and what do those costs -- how do those costs compare to your next best alternative. So, the notion of the costs that have already been spent as being sunk is something that you do ignore and we're just simply pointing that out, that's the company's practice, we agree with it and that's fairly industry standard.

Q Wasn't that what led to the massive cost overruns in the projects, you know, 20 years ago, where basically, you know, they'd make a budget, say 3 billion, they'd spend 2 billion and then they'd say hey, it's another billion more and say, well, if it costs 4 billion --

VICE CHAIRMAN McDONALD: Mr. Chairman, we're reflecting again.

MR. PRENOVITZ: No, I -- this is very important because what they're -- they're getting in the same problem that they had 20 years ago.

CHAIRMAN EVERETT: That was a perception, sir, not a --

MR. PRENOVITZ: Okay. Well, my perception.

CHAIRMAN EVERETT: Yeah, but we don't allow your perception here --

MR. PRENOVITZ: But it's an accurate one, sir.

CHAIRMAN EVERETT: But it's not --

MR. PRENOVITZ: I can prove it.

CHAIRMAN EVERETT: Well, it's not --

MR. PRENOVITZ: But not today.

MR. GREENE: Mr. Chairman, I assure you he cannot show us cost overruns identified in the budget process. That would be my objection.

CHAIRMAN EVERETT: Right.

BY MR. PRENOVITZ:

Q On page 26 of your testimony, you make reference to the fact that in 25 -- you're talking about the different projections or what might likely happen, so 25 percent cost overrun makes the project unfeasible, is that correct?

A (Witness Newsome) Under certain gas assumptions.

COMMISSIONER EATON: For clarification, any project has potential cost overruns, right? I mean, if we'd gone down the road of natural gas on the same scale as nuclear, I mean, they could potentially have cost overruns on that project as well, right?

CHAIRMAN EVERETT: And also what you stated was not exactly correct. It's a 25 percent cost overrun results in the project being uneconomical 8 of 11 cases so it doesn't -- you made a flat statement --

MR. PRENOVITZ: Okay.

CHAIRMAN EVERETT: -- that it's always --

MR. PRENOVITZ: 8 out of 11 is about, what, 75 percent of the time?

The information presented on the following pages was originally presented in the rebuttal testimony of Steven R. Sim in the FPSC's Docket No. 080407 – EG. The subject matter presented here from that docket – the fact that a typical screening curve approach that develops levelized cents/kwh cost values for individual resource options is a fundamentally flawed way in which to attempt to compare a variety of different resource options – is also a subject in this nuclear cost recovery docket (Docket No. 100009 – EI).

V. NRDC-SACE's "Economic Analysis"

Q. Did any of the NRDC-SACE witnesses provide a meaningful, comprehensive economic analysis that showed what the results would be for any Florida utility system if it were to adopt their recommended approach to goals setting?

A. No.

Q. Did they provide any economic analysis at all?

A. No. The entire extent of their "economic analysis" was to state in various testimonies that (paraphrasing) it costs less on a cents/kWh basis to save a kWh through DSM than to generate a kWh with a new power plant. Witness Wilson's testimony includes an Exhibit JDW-3, page 9 of 15 that shows the *"levelized cost of new energy resources in cents per kWh"* to be in the 2 to 4 cents/kWh range for energy efficiency and in the 7.3 to 10 cents per kWh range for a combined cycle unit. (Other Supply options are addressed as well.) Witness Mosenthal quotes this same price range of 2 to 4 cents per kWh for DSM on page 34, lines 2 – 3 of his testimony. Witness Steinhurst's testimony states that *"the cost of saved energy for those leading DSM programs is on the order of $0.02 – 0.03/kWh"* on page 30, lines 1 – 2. Neither Witness Mosenthal nor Witness Steinhurst state whether the values they quote are levelized values or represent some other type of value.

Unfortunately, this is the full extent of NRDC-SACE's "economic analysis" that is provided to support their recommendation of how DSM goals should be set for Florida.

Q. Did their testimonies at least provide the information used to develop these cents per kWh values so that one could determine key aspects of the calculation including, but not limited to: which DSM programs were examined, what costs were included in the calculations, what costs were excluded in the calculations, the vintage of assumptions, what years the calculation addressed, what year or years the costs were levelized to, and how the calculations were performed?

A. No.

Q. Besides the fact that no explanation or detail is provided for these calculations, what is your reaction to NRDC-SACE's use of a cents/kWh approach for comparing resource options?

A. I was both surprised and disappointed in their "economic analysis." I was surprised because the testimonies of the NRDC-SACE witnesses repeatedly attempt to make the case that the RIM test; i.e., a cost-effectiveness test that measures the impacts to the utility system's cents/kWh electric rate of competing resource options, is not the appropriate test to use in judging DSM options that compete with Supply options. Nevertheless, all three of these NRDC-SACE witnesses have attempted to compare competing resource options on a cents/kWh basis and state that the results of this electric rate comparison should be used to justify the selection of DSM options.

Therefore, despite their protestations to the contrary, it is obvious that the NRDC-SACE witnesses really believe that a comparison of resource options that is based on an electric rate comparison is the correct way by which to conduct economic analyses of competing resource options. On that basic point the NRDC-SACE and I are in complete agreement.

However, I was also disappointed because NRDC-SACE's witnesses have selected an analytical approach that is fundamentally flawed for the analysis they are trying to use it for: an economic comparison of two very different resource options.

Q. Why is their analytical approach fundamentally flawed when used to compare two resource options that are as different as a DSM measure and a Supply option?

A. The problems in using this analytical approach for comparing two widely dissimilar resource options such as DSM and a Supply option have been previously discussed in prior Commission proceedings. However, if NRDC-SACE (and GDS) truly believe that this is a "best practice" analytical approach, it is probably worthwhile to discuss this issue again in depth.

Let's start by focusing on Witness Wilson's levelized cost values. (Although it is reasonable to assume that the cents/kWh values used by witnesses

Mosenthal and Steinhurst are also levelized cost values, their failure to adequately describe what these values represent leaves one unsure.)

The analytical approach behind the levelized cost values presented by Witness Wilson is generally referred to as a "screening curve" analysis. In a screening curve analysis, one looks at a resource option, assumes that it operates at a given capacity factor or a range of capacity factors, and then calculates the present value costs of operating only this individual resource option over a number of years. These costs are then typically presented in terms of a levelized (or constant) $/MWh, or the equivalent levelized cents/kWh, value over the years addressed in the analysis.

By using this analytical approach to compare two very dissimilar resource options - a DSM measure versus a Supply option (for example, a baseload generating unit such as a combined cycle or nuclear unit) - NRDC-SACE (and GDS) is making a classic error that I have seen beginning resource planners and inexperienced analysts make of trying to utilize a screening curve approach to analyze two resource options that impact the utility system in very different ways.

The usefulness of a screening curve analysis is actually very limited. It can be used in a meaningful way to compare the economics of two competing resource options that are identical or very comparable in at least the following four (4) key characteristics: (i) capacity (MW); (ii) annual capacity factors;

(iii) the percentage of the option's capacity (MW) that can be considered as firm capacity at the utility's system peak hours; and (iv) the projected life of the option. If two resource options are identical or very comparable in at least these four key characteristics, then a screening curve analysis can be meaningful and one could "screen out" the less attractive of the two almost identical options. (This leads to the common terminology of this type of analysis as a "screening curve" analysis.)

However, a screening curve analytical approach that attempts to compare resource options that are not identical or even closely comparable in at least these four characteristics will produce incomplete results that are of little value. Indeed, the less comparable these characteristics are for the resource options being analyzed, the less meaningful are the results. Because a DSM measure and a combined cycle unit are about as different in terms of resource options as one can get, a screening curve approach attempting to analyze these types of resource options provides meaningless results.

The reason is because a typical screening curve analysis does not address the numerous economic impacts that these resource options will have on the utility system as a whole. Instead, a screening curve approach merely looks at the cost of operating the individual option itself. One can think of a screening curve analysis as examining the costs of a resource option if it were placed out in an open field by itself and operated without its operation having any impact

on the utility system. The numerous impacts an individual resource option has on the utility system – for example, how it impacts the operation of all the other generating units on the system – is typically ignored in a screening curve approach.

However, the system impacts of any resource option are very large and can result in significant system cost savings that should be credited back to the resource option in order to have a complete picture. Any analytical approach, such as a screening curve approach, that ignores system cost impacts can only provide an incomplete, and therefore incorrect, result.

Q. Can you provide an example of a system cost impact that is not captured in a screening curve analysis for a single new resource option?

A. Yes. Let's assume that the resource option in question is a combined cycle unit. In a screening curve analysis, one assumes that this generating unit will operate at a particular capacity factor (or range of capacity factors). For purposes of this discussion, we'll assume the generating unit operates 90% of the hours in a year. Then, using the generating unit's capacity and heat rate, plus the projected cost of the fuel the generating unit would burn, the annual fuel cost of operating the generating unit for 90% of the hours in a year is calculated. This calculation is then repeated for each year addressed in the screening curve analysis.

In a screening curve analysis, the unit's annual fuel costs – which will be very large for a baseload generating unit – are added to all of the other costs (capital, O&M, etc.) of building and operating this individual generating unit. The present value total of these costs is then used to develop a levelized $/MWh or cents/kWh cost for this generating unit.

However, the screening curve analysis approach does not take into account the fact that this new baseload generating unit would not operate on a utility system at 90% of the hours in a year if it was not cheaper to operate this new unit than to operate other existing generating units on the system. In other words, for every hour the new baseload generating unit operates, the MWh it produces displace more expensive MWh that would have been produced by the utility's existing generating units. Whatever the annual fuel cost is of operating this new generating unit 90% of the hours in a year, the utility will save an even greater amount of system fuel costs saved by reducing the operation of one or more existing units during these hours.

For example, let's say that the new generating unit's annual fuel cost would be $100 million per year, but that the operation of this new unit will also result in a savings of $110 million in fuel costs from reduced operation of the system's more expensive existing units. A typical screening curve analysis will include the $100 million cost value for the individual unit, but ignore the $110 million in system fuel savings that will also occur.

For this reason a typical screening curve analysis approach utilizes an incomplete set of information and, therefore, is an incorrect way to thoroughly analyze resource options. A complete analytical approach would take into account the total system fuel cost impact of a net system fuel savings of $10 million (= $110 million in system fuel savings - $100 million in unit fuel cost) instead of only the fuel expense of the individual combined cycle unit. Consequently, a typical screening curve analysis will grossly overstate the actual net system fuel cost of the new generating unit.

In similar fashion, other system cost impacts, such as environmental compliance costs and variable O&M, are not accounted for in typical screening curve analyses because this approach does not take into account the fact that the new generating unit will reduce the operating hours of the utility's existing generating units. Nor does a screening curve approach account for the impact the resource option will have in regard to meeting the utility's future resource needs. Therefore, the screening curve approach utilizes incomplete information for a number of cost categories, thus providing incorrect results.

Q. **The discussion above showed how a screening curve analytical approach utilizes incomplete information and leads to incomplete system cost results for a single new resource option. Is the screening curve approach**

become even more problematic when attempting to compare two or more different types of resource options?

A. Yes. This can be shown by a qualitative discussion that looks at several different types of resource options. Let's assume that a screening curve approach is used in an attempt to economically compare a few different resource options, three utility generating options and one DSM option:

- Combined cycle option A (1,000 MW)
- Combined cycle option B (1,000 MW)
- Combined cycle option C (500 MW)
- DSM option (100 MW)

Let's assume that the first comparison attempted is of two virtually identical combined cycle (CC) units, CC options A and B, in which the four key characteristics of the two CC units are identical. But let's assume that the capital cost of CC option A is lower by $1 million than the capital cost of CC option B.

In this comparison, even though a screening curve analysis will not provide an accurate system net cost value as per the above discussion, because the impacts to the operation of existing generating units on the system will be identical from two CC units that are the same in regard to capacity (1,000 MW), capacity factor (due to an assumption of identical heat rates and other factors that drive capacity factor), the amount of firm capacity (1,000 MW)

each unit will provide, and the life of the two units, a screening curve analysis will give a meaningful comparison of the two options. (In other words, even though the results will not be accurate from a system cost perspective for either of the two options, the results will be "off" by the same amount and in the same direction.) As would be expected, the screening curve results will show that CC option A results in a slightly lower $/MWh value for CC option A compared to CC option B due to its $1 million lower capital costs.

As this example shows, a screening curve analytical approach can produce meaningful results in a case in which the four above-mentioned characteristics of resource options are identical or very comparable. However, as the on-going discussion will show, once these factors for competing resource options are no longer comparable, a typical screening curve approach cannot produce meaningful results.

Q. Why would a screening curve approach break down if one attempted to compare otherwise identical generating units that differ only by their size such as CC option A (1,000 MW) and CC option C (500 MW)?

A. Now at least one of the four key characteristics of resource options that must be identical or very comparable in order for a screening curve approach to provide meaningful results differ significantly between CC option A and CC option C. This is the capacity of the two options: 1,000 MW for CC option A and 500 MW for option C. Even if one were to assume that all other assumptions for the two units were identical (capacity factor, percentage of

capacity that is firm capacity, life of the units, heat rate, capital cost per kW, etc.), the significant difference in capacity offered by the two options would cause a screening curve approach to yield incomplete, and therefore incorrect, results.

The capacity difference between these options would result in at least two system impacts that would not be captured by a screening curve approach. The first of these is the impact of each of the two CC options on the utility's future resource needs. The 1,000 MW of CC option A will address the utility's future resource needs twice as much as will the 500 MW of CC option C. Therefore, CC option A will avoid/defer future resource additions to a greater extent that will CC option C. This will show up in a system cost analysis in the form of different system capital, fuel, O&M, environmental compliance, etc. costs beginning at some point in the future when the utility begins to have resource needs.

In addition, even prior to that point in the future when new resources are needed, the 500 MW greater capacity of CC option A will result in different system fuel cost, variable O&M, and environmental compliance cost impacts as the operation of the utility's existing generating units are reduced to a greater extent than with CC option C.

None of these system economic impacts that are driven by the difference in the capacity of two competing resource options are typically captured in a screening curve approach. The earlier discussion pointed out that a screening curve approach applied to even a single new resource option will omit a variety of significant system cost information that is necessary to develop a complete cost perspective of the one resource option. Now we see that an attempt to use a screening curve approach to compare the economics of two resource options that differ significantly in only their capacity will omit an even greater amount of important system cost information. Therefore, the use of a screening curve approach is definitely flawed when used to compare two new resource options that differ in just one of the four key characteristics listed above.

Q. The previous examples discussed only Supply options. Do similar problems exist if one were to attempt to compare DSM options to supply side options using a screening curve approach?

A. Yes. All of the problems inherent in using a screening curve approach that omits the system cost impacts discussed above are equally applicable whether Supply or DSM options are being addressed.

In this example, the system impacts of the lower amount of DSM (100 MW) on future resource needs would not be captured in a typical screening curve analysis. This would lead to the same type of incomplete and incorrect analysis discussed previously. Even if one were to adjust the 100 MW of

demand reduction from DSM to account for the fact that 100 MW of DSM would be equivalent to 120 MW of supply side capacity (if the utility had a 20% reserve margin criterion), 120 MW of one option will be at a disadvantage compared to larger resource options in terms of avoiding/deferring future resource needs of the utility.

In addition, DSM options vary widely in terms of their actual contribution during system peak hours. Many DSM programs reliably reduce demand during the summer and winter peak hours such as load control, building envelope, heating/ventilation/air conditioning (HVAC) programs to name a few. However, other DSM programs may contribute little or no demand reduction at the summer peak hour, at the winter peak hour, or at either peak hour. A streetlight program would be an example of such a program.

Presentations of screening curve analyses of DSM options, such as in Witness Wilson's exhibit, typically lump a wide variety of DSM options together regardless of the capability of these DSM options to lower peak hour demand. This form of presentation further clouds one's understanding of what DSM options are actually being addressed and does not allow an observer to fully understand the breadth of the system impacts that are not being captured in a screening curve analysis.

Q. Please summarize why a comprehensive economic analysis that includes system cost impacts of resource options, such as the analytical process

FPL utilized, is superior to the NRDC-SACE screening curve "economic analysis" approach?

A. There are a large number of cost impacts to consider if one is attempting to provide a complete analysis of competing resource options. Some of these cost impacts are driven solely from the operation of the resource option itself while other cost impacts are utility system impacts driven by integrating and operating a resource option with the utility's existing generating units.

A screening curve approach typically addresses only the costs of operating the individual unit itself. As discussed above, this approach omits all of the system cost impacts that are crucial to capturing the complete costs of a resource option.

In contrast, a system economic approach – such as that utilized by FPL in the analyses presented in this docket - not only captures all of the costs of operating the individual resource option, but also captures the system costs and cost savings of operating the entire FPL system with the resource option.

Q. Can you provide a quantitative example of how the cents per kWh results of a typical screening curve approach might change if one were to account for even one or two system impacts that are typically omitted by this analytical approach?

A. Yes. Staff Interrogatory Number 57 in this docket requested the results of a screening curve analysis of the 2019 combined cycle unit used in FPL's DSM

screening analyses. FPL provided these results, along with a condensed version of the qualifiers discussed at length above that explain the significant limitations of using this levelized cost value when comparing a combined cycle unit to very dissimilar resource options.

The levelized cost value FPL provided in response to Staff's request is $162/MWh assuming a 90% capacity factor with costs levelized in 2019$. This value is equivalent to a levelized 16.2 cents/kWh in 2019$. (Screening curve analyses are often presented in levelized $/MWh values for either the in-service year of the unit or for the year in which the analysis was performed.) As previously mentioned, NRDC-SACE provides no information regarding what year $ their levelized values are in. Let's give them the benefit of the doubt and assume that they at least tried to put the values for the resource options (which would almost certainly have different in-service years) on a common year basis. This is most commonly done through levelizing costs to the year in which the analysis was done. Therefore, let's convert the $162/MWh value in 2019$ to an equivalent 2009$ value.

Exhibit SRS-14 provides the summary page of that analysis. The levelized value for this same unit at a 90% capacity factor now becomes $69/MWh in 2009$. This value is highlighted in the box on the left-hand side of the page. This exhibit shows that FPL accounted for all projected costs of building and operating this individual unit over the projected 25-year life of the unit. The

calculation does not account for offsetting system cost impacts as is typical in screening curve analysis. Because NRDC-SACE presented their values in terms of cents/kWh, I'll do so as well. The $69/MWh value translates to 6.9 cents/kWh. (NRDC-SACE's value for a CC unit was in the 7.3 to 10.0 cents/kWh range.)

Exhibit SRS-15 now takes a more realistic, but still highly conservative assumption (in order to make the math easier to follow and to be consistent with the system fuel cost savings example discussed above). In Exhibit SRS–15, the impacts of only two of the many system impacts have been included: system fuel savings and system environmental compliance cost savings.

The conservative assumption used is that both the system fuel cost savings and the system environmental compliance cost savings will be 10% of the combined cycle unit's costs in those categories. For example, the fuel cost value for this individual unit for the year 2019 in Exhibit SRS–14 is $865,447 (in $000). The new assumption used in developing Exhibit SRS-15 is that the system would actually realize a saving of 1.10 x $865,447 ($000) = $951,992 ($000) from reduced operation of the other units on the system.

Consequently, a net system fuel savings of $86,545 ($000) (= $951,992 - $865,447) would occur. This value shows up as a negative value, ($86,545) ($000), in Exhibit SRS–15 for the 2019 fuel cost value to denote this savings.

A similar calculation is made for all years for the fuel costs and the environmental compliance costs.

Even with this conservative assumption for FPL's system, the screening curve's levelized cost value for the combined cycle unit at a 90% capacity factor has now dropped from $69/MWh or 6.9 cents/kWh to $12/MWh or 1.2 cents/kWh.

Therefore, even by making a simple adjustment to a screening curve analysis to account for only two of many system impacts of adding a combined cycle to a utility system such as FPL's, the levelized cost projection from the screening curve analysis is dramatically lowered from 6.9 cents/kWh to 1.2 cents/kWh. And, as discussed previously, there are a number of other system impacts that still not accounted for in this example.

The moral of the story is that, by leaving out system cost impacts, typical screening curve analyses are based on very incomplete information and can provide very misleading results as demonstrated by this example. This points out how meaningless the cents per kWh values are that NRDC-SACE presented as its "economic analysis."

Screening Curve Results for 2019 CC Unit: With No System Impacts (2009$)

Unit 1
Combined Cycle

Discount Factor:	0.088869
Base (MW) (blended summer/winter)	1,219
Heat Rate	6,582
Fixed O&M ($/kW-yr)	6.65
Capital Replace ($/kW-yr)	10.93
VOM ($/MWh)	1.36
Gas Transportation ($/kW-yr)	132.12
in-service year	2019
book life	25
costs in entered in year $s	2019

Combined Cycle

Capacity Factor (%)	Levelized $/kW	Levelized $/MWh
0	131	-
5	154	352
10	177	202
15	200	152
20	223	127
25	246	112
30	269	103
35	292	96
40	316	90
45	339	86
50	362	83
55	385	80
60	408	78
65	431	76
70	454	74
75	477	73
80	500	71
85	523	70
90	546	69
95	569	68
100	592	66

Nominal $ each year — Natural Gas 1

	Fixed Costs				Variable Costs					
Year	Capital $000	Fixed O&M $000	Capital Repl $000	Gas Transportation $000	NOx Emission $000	SO2 Emission $000	CO2 Emission $000	Fuel Costs $000	Variable O&M $000	Total $000
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0
2019	258,093	8,106	13,319	161,056	694	610	103,768	865,447	14,556	1,425,649
2020	248,821	8,309	13,652	161,056	760	667	112,272	912,227	14,920	1,472,683
2021	238,528	8,516	13,994	161,056	832	731	121,135	930,501	15,293	1,490,586
2022	228,618	8,729	14,343	161,056	911	800	136,580	949,141	15,675	1,515,855
2023	219,061	8,947	14,702	161,056	998	877	146,358	968,154	16,067	1,536,221
2024	209,831	9,171	15,070	161,056	1,093	960	163,062	987,547	16,469	1,564,259
2025	200,889	9,400	15,446	161,056	1,198	1,052	180,509	1,007,328	16,881	1,593,760
2026	192,194	9,635	15,832	161,056	1,022	1,028	191,875	1,027,505	17,303	1,617,450
2027	183,630	9,876	16,228	161,056	872	1,005	210,720	1,048,085	17,735	1,649,207
2028	175,085	10,123	16,634	161,056	745	982	230,387	1,069,076	18,179	1,682,266
2029	166,541	10,376	17,050	161,056	636	960	258,285	1,090,487	18,633	1,724,024
2030	157,997	10,636	17,476	161,056	543	939	279,871	1,112,327	19,099	1,759,943
2031	149,455	10,902	17,913	161,056	407	911	304,610	1,134,603	19,576	1,799,433
2032	140,914	11,174	18,361	161,056	264	881	331,183	1,157,325	20,066	1,841,223
2033	132,374	11,454	18,820	161,056	113	849	359,684	1,180,501	20,567	1,885,418
2034	123,939	11,740	19,290	161,056	0	815	390,214	1,204,140	21,082	1,932,276
2035	115,716	12,033	19,773	161,056	0	778	422,875	1,228,252	21,609	1,982,091
2036	107,598	12,334	20,267	161,056	0	740	457,776	1,252,847	22,149	2,034,765
2037	99,481	12,643	20,774	161,056	0	698	495,030	1,277,933	22,703	2,090,316
2038	91,365	12,959	21,293	161,056	0	655	534,754	1,303,521	23,270	2,148,872
2039	83,933	13,283	21,825	161,056	0	608	577,072	1,329,621	23,852	2,211,249
2040	77,866	13,615	22,371	161,056	0	559	622,110	1,356,242	24,448	2,278,268
2041	72,484	13,955	22,930	161,056	0	507	670,002	1,383,396	25,059	2,349,390
2042	67,102	14,304	23,503	161,056	0	453	720,887	1,411,093	25,686	2,424,085
2043	61,722	14,661	24,091	161,056	0	395	774,909	1,439,344	26,328	2,502,507
2044	0	0	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0	0	0	0
2050	0	0	0	0	0	0	0	0	0	0
2051	0	0	0	0	0	0	0	0	0	0
NPV 2009	861,387	45,969	75,534	742,016	3,007	3,758	1,132,607	4,845,589	82,548	7,792,416
	65	3	6	56	0	0	86	368	6	592

Screening Curve Results for 2019 CC Unit: With Only Two System Impacts (2009$)

Unit 1
Combined Cycle

Discount Factor:	0.088869
Base (MW) (blended summer/winter)	1,219
Heat Rate	6,582
Fixed O&M ($/kW-yr)	6.65
Capital Replace ($/kW-yr)	10.93
VOM ($/MWh)	1.36
Gas Transportation ($/kW-yr)	132.12
in-service year	2019
book life	25
costs in entered in year $s	2019

Combined Cycle

Capacity Factor (%)	Levelized $/KW	Levelized $/MWh
0	131	-
5	129	295
10	127	145
15	125	95
20	123	70
25	121	55
30	119	45
35	117	38
40	115	33
45	113	29
50	111	25
55	110	23
60	108	20
65	106	19
70	104	17
75	102	15
80	100	14
85	98	13
90	96	12
95	94	11
100	92	10

Nominal
$ each year

Natural Gas
1

Year	Fixed Costs				Variable Costs					
	Capital $000	Fixed O&M $000	Capital Repl $000	Gas Transportation $000	NOx Emission $000	SO2 Emission $000	CO2 Emission $000	Fuel Costs $000	Variable O&M $000	Total $000
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	0	0	0
2012	0	0	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	0	0	0
2018	0	0	0	0	0	0	0	0	0	0
2019	258,093	8,106	13,319	161,056	(69)	(61)	(10,377)	(86,545)	14,556	358,079
2020	248,821	8,309	13,652	161,056	(76)	(67)	(11,227)	(91,223)	14,920	344,165
2021	238,528	8,516	13,994	161,056	(83)	(73)	(12,114)	(93,050)	15,293	332,067
2022	228,618	8,729	14,343	161,056	(91)	(80)	(13,658)	(94,914)	15,675	319,679
2023	219,061	8,947	14,702	161,056	(100)	(88)	(14,636)	(96,815)	16,067	308,195
2024	209,831	9,171	15,070	161,056	(109)	(96)	(16,306)	(98,755)	16,469	296,330
2025	200,889	9,400	15,446	161,056	(120)	(105)	(18,051)	(100,733)	16,881	284,664
2026	192,194	9,635	15,832	161,056	(102)	(103)	(19,187)	(102,750)	17,303	273,878
2027	183,630	9,876	16,228	161,056	(87)	(101)	(21,072)	(104,808)	17,735	262,457
2028	175,085	10,123	16,634	161,056	(74)	(98)	(23,039)	(106,908)	18,179	250,957
2029	166,541	10,376	17,050	161,056	(64)	(96)	(25,829)	(109,049)	18,633	238,619
2030	157,997	10,636	17,476	161,056	(54)	(94)	(27,987)	(111,233)	19,099	226,896
2031	149,455	10,902	17,913	161,056	(41)	(91)	(30,461)	(113,460)	19,576	214,849
2032	140,914	11,174	18,361	161,056	(26)	(88)	(33,118)	(115,732)	20,066	202,605
2033	132,374	11,454	18,820	161,056	(11)	(85)	(35,968)	(118,050)	20,567	190,156
2034	123,939	11,740	19,290	161,056	0	(81)	(39,021)	(120,414)	21,082	177,590
2035	115,716	12,033	19,773	161,056	0	(78)	(42,287)	(122,825)	21,609	164,996
2036	107,598	12,334	20,267	161,056	0	(74)	(45,778)	(125,285)	22,149	152,267
2037	99,481	12,643	20,774	161,056	0	(70)	(49,503)	(127,793)	22,703	139,289
2038	91,365	12,959	21,293	161,056	0	(65)	(53,475)	(130,352)	23,270	126,050
2039	83,933	13,283	21,825	161,056	0	(61)	(57,707)	(132,962)	23,852	113,218
2040	77,866	13,615	22,371	161,056	0	(56)	(62,211)	(135,624)	24,448	101,465
2041	72,484	13,955	22,930	161,056	0	(51)	(67,000)	(138,340)	25,059	90,094
2042	67,102	14,304	23,503	161,056	0	(45)	(72,089)	(141,109)	25,686	78,408
2043	61,722	14,661	24,091	161,056	0	(39)	(77,491)	(143,934)	26,328	66,394
2044	0	0	0	0	0	0	0	0	0	0
2045	0	0	0	0	0	0	0	0	0	0
2046	0	0	0	0	0	0	0	0	0	0
2047	0	0	0	0	0	0	0	0	0	0
2048	0	0	0	0	0	0	0	0	0	0
2049	0	0	0	0	0	0	0	0	0	0
2050	0	0	0	0	0	0	0	0	0	0
2051	0	0	0	0	0	0	0	0	0	0
NPV 2009	861,387	45,969	75,534	742,016	(301)	(376)	(113,261)	(484,559)	82,548	1,208,958
	65	3	6	56	(0)	(0)	(9)	(37)	6	92

Comparison of Key Assumptions Utilized in the 2009 and 2010 Economic Analyses of FPL Nuclear Projects: Summer Peak Demand Load Forecast (Expanded)

(Summer MW)

	(1)	(2)	(3) = (2) - (1)	(4)	(5)
Selected Years	2009 Feasibility Analysis	2010 Feasibility Analysis	Change in 2010 Forecast	Annual Growth with 2010 Peak Demand Forecast	Cumulative Growth with 2010 Peak Demand Forecast
2010	21,147	21,922	775	---	---
2011	21,368	21,788	420	(134)	(134)
2012	21,933	22,139	206	351	217
2013	22,249	22,332	83	193	410
2014	23,533	23,575	42	1,243	1,653
2015	24,142	23,924	(218)	349	2,002
2016	24,772	24,344	(428)	420	2,422
2017	25,401	24,774	(627)	430	2,852
2018	26,143	25,328	(815)	554	3,406
2019	26,848	25,785	(1,063)	457	3,863
2020	27,715	26,348	(1,367)	563	4,426
2021	28,449	26,824	(1,625)	476	4,902
2022	29,109	27,191	(1,918)	367	5,269
2023	29,758	27,929	(1,829)	738	6,007
2024	30,339	28,533	(1,806)	604	6,611
2025	30,973	29,135	(1,838)	602	7,213
2030	33,931	31,691	(2,240)	---	---
2035	35,148	32,950	(2,198)	---	---
2040	37,622	35,557	(2,065)	---	---

SACE's Inconsistency Regarding CO_2 Costs

SACE testimony on FPL's projected medium CO_2 compliance costs		
DSM (Docket No. 080407-EG)	**NCRC (Docket No. 090009-EI)**	**NCRC (Docket No. 100009-EI)**
"I conclude those values to be at the extreme ***low end*** of the reasonable range of estimates." (TR. 1108 lines 13 - 14) (emphasis added) SACE/ NRDC Witness Steinhurst testifying on same CO2 projection as in Docket 090009-EI	"The companies have put a ***high price*** on carbon in their economic analyses." (TR. 562 line 23 – TR. 563 line 1) (emphasis added) SACE Witness Cooper testifying on same CO2 projection as in Docket 080407-EI	"The companies have put a ***high price*** on carbon in their economic analyses." (Cooper testimony, page 22 lines 14-15) (emphasis added) SACE Witness Cooper's current NCRC testimony
Criticized CO2 cost projections as **too low** in support of increasing FPL's DSM Goals	Criticized CO2 cost projections as **too high** in support of terminating new nuclear investment	Criticized CO2 cost projections as **too high** in support of terminating new nuclear investment
<u>Conclusion:</u> SACE took inconsistent positions concerning the same set of CO_2 compliance cost projections in order to argue for higher DSM goals and discourage new nuclear units.		

Docket No. 100009-EI
SACE's Inconsistency Regarding CO2 Costs
Exhibit SRS – 16, Page 1 of 1